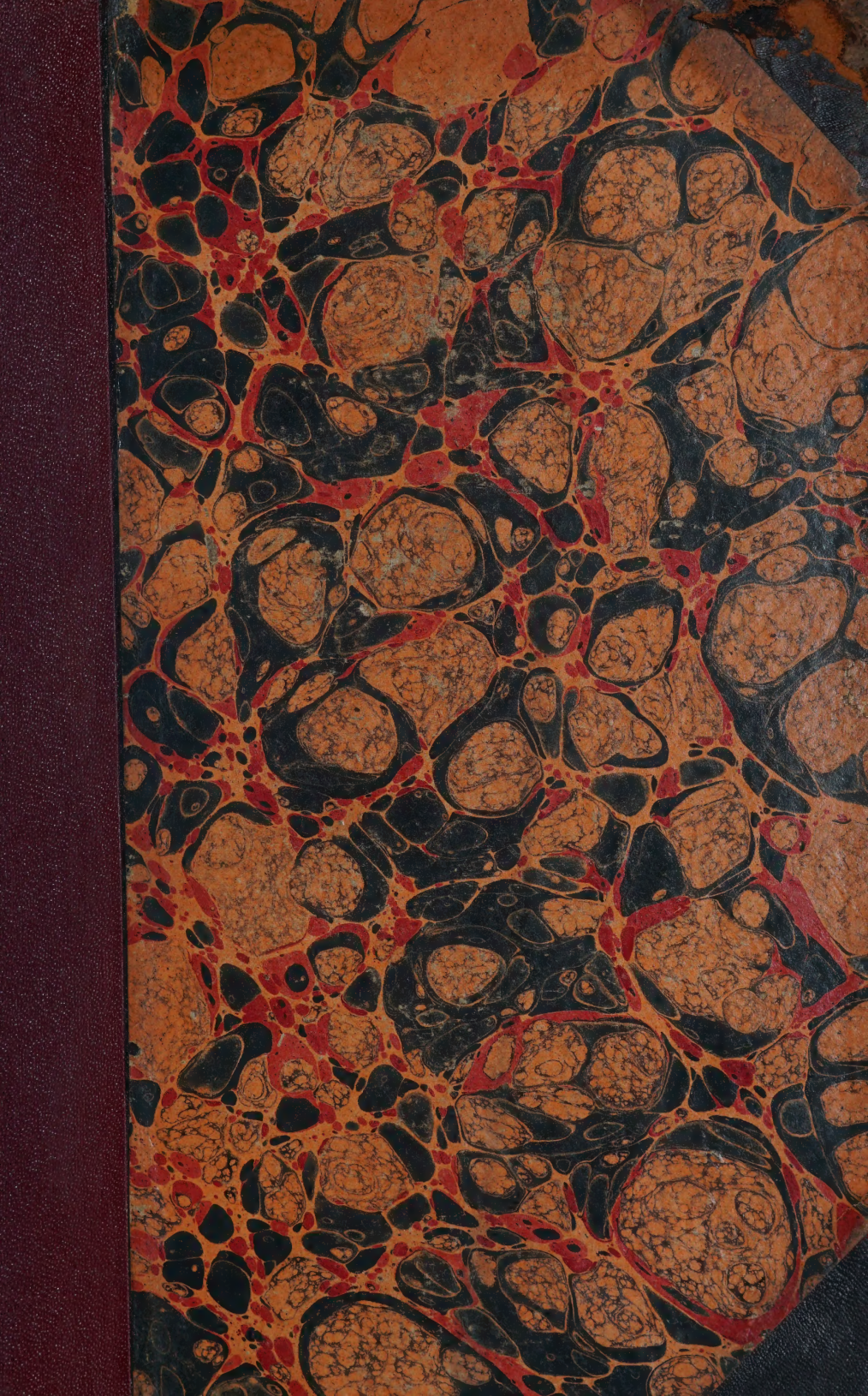
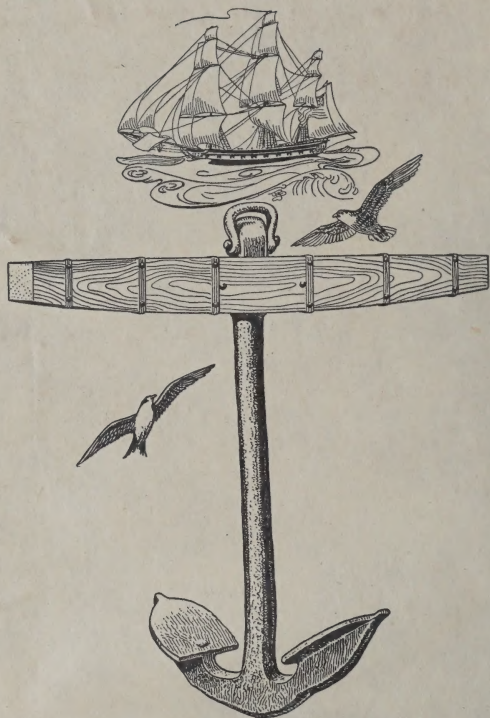




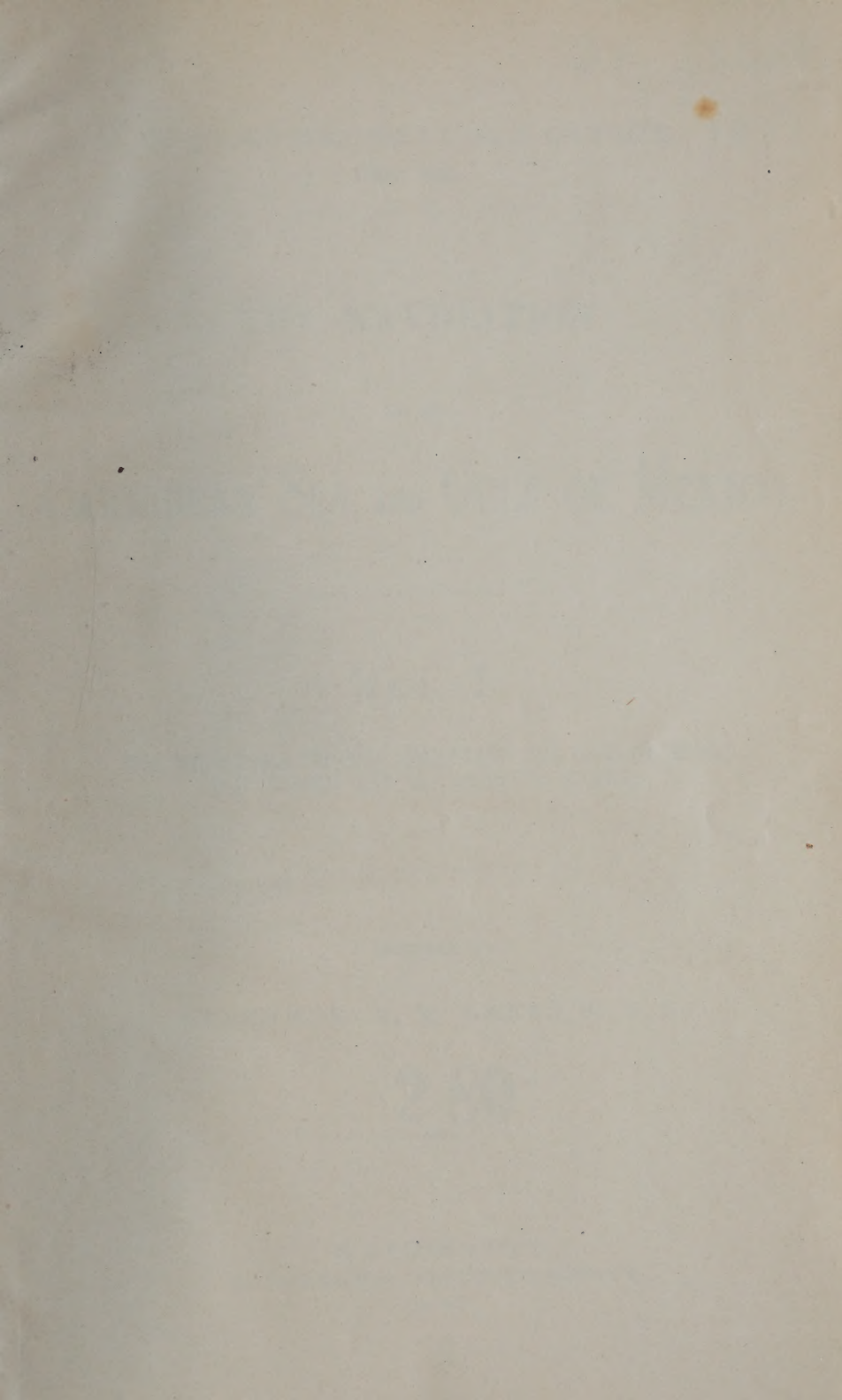
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U. S. HYDROGRAPHIC OFFICE. 1877
No. 63.

THE NAVIGATION
OF THE
CARIBBEAN SEA AND GULF OF MEXICO.

Vol. I.

THE WEST INDIA ISLANDS, INCLUDING THE BAHAMA BANKS
AND ISLANDS AND THE BERMUDA ISLANDS.

COMPILED BY

LT. COMDR. F. M. GREEN, U. S. N. .

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WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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ADVERTISEMENT.

The first volume of the Navigation of the Caribbean Sea and Gulf of Mexico contains sailing-directions for the islands of the West Indies, including the Bahama islands and banks and the Bermudas.

It is believed that the latest discoveries and surveys have been embodied in this work; but so large a portion of the coasts described still remain to be surveyed, that officers of the Navy and of the merchant-service are earnestly requested to forward at once to the United States Hydrographic Office any information they may become possessed of which may serve to correct imperfections in this work.

The coasts of Cuba, Santo Domingo, and Puerto Rico are still very imperfectly laid down on the charts, and doubtless many shoals and dangers exist along those coasts of which there is no record.

In compiling this work, the excellent description of the English islands, in the *West India Pilot*, 3d edition, 1876, has been largely drawn from.

The following works have also been consulted: *Mer des Antilles et Golfe du Mexique*, par A. Le Gras, 1875; *Description Nautique des Côtes de la Martinique*, par M. Monnier; *Pilote de la Guadeloupe*, par E. Ploix, 1875; *Derrotero de las Islas Antillas*, 1863; Remark-Books of United States Naval Vessels on the West India Station, and United States Navy Hydrographic Notices.

R. H. W.

U. S. HYDROGRAPHIC OFFICE,
Washington, D. C., January, 1877.

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NOTE.

The bearings and courses are in all cases true.

Distances are given in geographical miles, one of which equals ten cables lengths.

CHAPTER I.

GENERAL REMARKS ON WINDS, CURRENTS, AND TIDES.

This work contains a description of the islands of the West Indies, including the Bahama banks and islands and the Bermudas, and of the eastern or Atlantic coast of America from cape Orange in French Guiana to the Rio Grande, forming the boundary between the United States and Mexico.

The first volume contains a description of the various islands and banks, with directions for navigating among them; the second volume describes the coast of the main-land, with its off-lying islands.

The West India islands and the neighboring banks lie within the limits of the NE. trade-winds, which blow from the eastward so constantly throughout the year as to have given rise to the terms "windward" and "leeward," universally employed to signify that a point is relatively to the eastward or westward.

These trade-winds are subject to diurnal and annual modifications, and are at times temporarily interrupted by other winds of varying force and direction.

The diurnal variations to which the trade-winds are subject are called land and sea breezes, which have especial characteristics for each locality. The sea-breeze generally sets in about 9 a. m., and blowing either directly on shore or according to the trend of the coast-line, at an angle to it, continues till about sunset, when a calm interval is succeeded by a light air off shore, attaining its greatest strength about day-dawn, and being succeeded by an oppressive calm to be again followed by the sea-breeze. On the coasts of Cuba, Santo Domingo, Porto Rico, and Jamaica the regular sequence of land and sea breezes is seldom interrupted. In the Virgin and Windward islands, as well as among the Bahamas, the land-breeze does not usually occur, but during the night the trade-winds are apt to die away, regaining their strength in the morning. Sailing-vessels therefore usually endeavor to go to sea at early day-light.

The changes of seasons in the West Indies are produced by changes of the sun's declination as elsewhere, dividing the year into the dry and the rainy season. The exact dividing-line between these seasons varies somewhat from local causes, but speaking generally, the rainy season lasts from June till November. During this season the wind inclines toward the SE. with torrents of rain. Calms and heavy squalls frequently occur, and hardly a year passes without a hurricane of more or less severity. This season is also known as the sickly season, from the great prevalence of dangerous fevers.

From November to June the wind draws more to the NE. and increases in strength, sometimes blowing a strong gale from this direction for two or three successive weeks in December, January, and February. Rain, though less frequent, is not of rare occurrence.

Occasionally strong winds from N. and NW. interrupt the trades, and blow very hard in the gulf of Mexico and among the Bahama islands. These are called northers, and occur from November to April.

These gales of wind bear a strong resemblance to the *pamperos* of the Rio de la Plata. Always heralding their approach by a heavy bank of clouds in the NW., and preceded by a light air from the contrary direction, accompanied by a falling barometer, they commence with a violent squall, gradually settling down into a fresh gale, which hauls to the NE. and E., ending with fine weather.

As the sun gets toward its extreme northern declination the rainy or hurricane season begins, and toward the middle of June rain falls in abundance.

July, August, and September are the months in which hurricanes occur most frequently. Several years sometimes pass without one of these storms, and sometimes two or three occur at short intervals in the same year.

From observations extending over nearly four centuries,* hurricanes have occurred in the West India islands and their vicinity in the following ratio per 100 for each month in the year: January, 1.5; February, 2; March, 3; April, 2; May, 1.5; June, 3; July, 7; August, 28.5; September, 24; October, 20.5; November, 5; December, 2.

* Blodget.—Climate of the United States, p. 400.

In the regions of which we are treating and throughout the northern hemisphere, the wind in these storms blows round a centre in a direction contrary to the movement of the hands of a watch, with probably a tendency to blow in toward the centre. It was supposed by those able meteorologists by whom the laws of circular storms were developed that the wind blew in concentric circles, but certain observed anomalies have given good ground to suppose that the course of the wind frequently has a spiral direction constantly approaching the centre.

The centre also has a movement which, in different hurricanes, is more generally similar in direction in the North Atlantic ocean than in other parts of the world.

Commencing generally in the North Atlantic ocean, between 10° and 15° N. latitude, and between 50° and 60° W. longitude, the average track of hurricanes forms a parabolic curve and takes about a WNW. course till the vertex of the curve is reached in about 30° N. latitude and from 70° to 80° W. longitude. Here the track generally curves sharply to the northward, following from the vertex the trend of the coast and the course of the Gulf stream to the NE. toward the Grand bank of Newfoundland and coast of Ireland.

Different storms, however, vary considerably from this track, some extending far into the gulf of Mexico like the famous one which scattered Admiral Solano's fleet in 1780 and the disastrous hurricane of 1875; others curve to the northward east of the Gulf stream like the Bermuda hurricane of 1839.

The islands of Trinidad, Tobago, and Grenada lie rather to the southward of the usual track of these storms and are therefore seldom visited by them.

The diameter of these storms varies from 20 or 30 to some hundreds of miles, and their onward progress also varies very much. As the centre or vortex is approached, the wind increases in violence and the furious gusts become more frequent; the mercury in the barometer falls steadily, rising again as the storm-centre recedes. The confused cross-sea at the centre is tremendous, and very few vessels could there escape serious disaster. The most important requisite there-

fore in experiencing one of these tempests is to keep the ship as far as possible away from the centre.

As the wind blows in a nearly circular course round the centre and always in the same direction, viz, against the hands of a watch, it is evident that the centre will always bear eight points from the direction of the wind. In the following table the bearing of the centre is shown for north latitude. In south latitude the bearings would be exactly contrary, as there the storm revolves in an opposite direction :

If the wind be—	The vortex of the storm will bear from the ship--	If the wind be—	The vortex of the storm will bear from the ship—
North.	East.	South.	West.
N. by E.	E. by S.	S. by W.	W. by N.
NNE.	ESE.	SSW.	WNW.
NE. by N.	SE. by E.	SW. by S.	NW. by W.
NE.	SE.	SW.	NW.
NE. by E.	SE by S.	SW. by W.	NW by N.
ENE.	SSE.	WSW.	NNW.
E. by N.	S. by E.	W by S.	N. by W.
East.	South.	West.	North.
E. by S.	S. by W.	W. by N.	N by E.
ESE.	SSW.	WNW.	NNE.
SE. by E.	SW. by S.	NW. by W.	NE. by N.
SE.	SW.	NW.	NE.
SE. by S.	SW. by W.	NW. by N.	NE. by E.
SSE.	WSW.	NNW.	ENE.
S. by E.	W. by S.	N. by W.	E. by N.

The following table, taken from Dove's Law of Storms, indicates the best plan to be followed to avoid the centre of a hurricane. To attempt to cross in front of a hurricane would be a most perilous undertaking, but, as is indicated in this table, if a vessel finds herself in the right-hand semicircle of the storm, she should heave to on the starboard tack; if in the left-hand semicircle, then the port tack is better, as in each case as the wind shifts the ship will come up instead of breaking off, and consequently will run far less risk of being taken aback :

HURRICANES.

Direction of wind at the beginning of storm.	Bearing of centre from ship.	If the shift of wind be from—	Then steer—	If the shift of wind be from—	Then—
NW	NE	NW	SE	NW	NW
NW by N	NE by E	NW by N	SE by S	NW by N	NW by N
NNW	ENE	NNW	SSE	NNW	NNW
N by W	E by N	N by W	S by E	N by W	N by W
North	East	North	South	North	North
N by E	E by S	N by E	S by W	N by E	N by E
NNE	ESE	NNE	SSW	NNE	NNE
NE	SE by E	NE by N	SW by S	NE by N	NE by N
NE by E	SE by S	NE by E	SW by W	NE by E	NE by E
ENE	SSE	ENE	WSW	ENE	ENE
E	S by E	E by N	W by S	E by N	E by N
E by N	South	E by S	West	E by S	E by S
E by S	S by W	ESE	NNW	ESE	ESE
ESE	SSW	SE by E	NW by W	SE by E	SE by E
SE	SW by S	SE	NW by N	SE	SE
SE by E	SW	SE by S	NNW	SE by S	SE by S
SE by S	WSW	SSE	NNW	SSE	SSE
S	W by W	S by E	N by W	S by E	S by E
S by E	W by S	SSE	North	SSE	SSE
South	West	South	N by E	South	South
S by W	W by N	S by W	N by S	S by W	S by W
SSW	NNW	SSW	NNE	SSW	SSW
SW	NW by W	SW by S	NE by N	SW by S	SW by S
SW by S	NW	SW	NE	SW	SW

In this table the shift of wind is supposed to be observed from a stationary point.

Heave to on the starboard tack.

Or else, heave the ship to on the port tack.

These storms rarely, if ever, approach without giving warning in time to make preparations for bad weather. In addition to the usual appearances of the clouds and sea before a storm, with which every seaman is familiar, the barometer is a trustworthy guide. Its range within the tropics is so small that any unusual depression, especially during the hurricane months, is almost always followed by a circular storm.

The reader is referred for further accounts of the nature of hurricanes and of the phenomena attending them to Piddington's *Sailor's Horn Book*, Dove's *Law of Storms*, and the *Law of Storms Considered Practically*, by W. H. Rosser.

Squalls.

Squalls of more or less severity are common on throughout the West Indies, especially during the summer months. They are generally of the arched form well known to sailors, and are almost always accompanied with thunder and lightning. They are most frequent near the land. White squalls, so called, are said to occur, giving little or no warning except the ripple on the water made by the wind. They are fortunately of very rare occurrence. Flaws of wind are frequently met with when coasting under high land, sudden gusts rushing down through the valleys. They should be carefully guarded against.

Currents.

Among the Windward and Virgin islands, in the Mona, Windward, and Bahama passages, on the shores of Porto Rico, Hayti, and Jamaica, and on the north coast of Cuba as far west as Matanzas, the current almost always sets to the westward with a force varying from one-fourth of a knot to 3 and even at times 4 knots. This westerly current is felt, but with less constancy, on the eastern side of the Bahama banks and islands, and is due partly to the constant trade-wind acting on the surface of the sea, and is partly a continuation of the great equatorial current which is deflected to the NW. by the coast of South America and rushes furiously through the passage between the islands of Trinidad and Grenada.

Though not invariably experienced the navigator should vigilantly guard against the effects of this probable current by never losing an opportunity by night or day of verifying his position.

In very many places the currents are much affected by the tides and still more affected by any interruption of the trade-wind, as will be shown particularly when treating of such localities.

The leeward side of the Mona passage in the vicinity of cape Engaño and the shores of the island of Anegada, before the establishment of the light on Sombrero island, have been strewn with numerous wrecks, owing to vessels being set to leeward by this current.

The powerful current of the Gulf stream has been by many writers considered as simply a consequence of this westerly current, which being forced through many channels into the Caribbean sea, is deflected by the coasts of Central America, Mexico, and the United States and is violently forced through the Florida strait. Its exact origin is, however, still a disputed question.

The most westerly point in the Florida strait where the influence of the Gulf stream may be felt is difficult to determine. Sometimes an easterly current of two miles an hour may be felt as far west as the meridian of the mouth of the Mississippi, but more frequently it commences between Havana and the Tortugas.

The following table shows the velocity and direction of the Gulf stream as observed at different seasons. It must be borne in mind, however, that both direction and velocity are powerfully influenced by meteorological conditions.

GULF STREAM.

Table showing the velocity and direction of the Gulf stream; observed during the different months of the year.

Months.	Latitude, N.	Longitude, W.	Velocity of the current in 24 hours.	Direction.	Temperature.		Remarks.
					Water.	Air.	
January	24 10	82 40	Miles 60	SSE. $\frac{1}{2}$ E.	.....	.....	Western entrance of the New Bahama channel.
	24 12	81 30	75	E. by N.	.....	.....	Do.
	24 47	80 10	65	E. by N.	.....	.....	Do.
	25 15	79 45	110	N. by E.	.....	.....	Exceptional velocity in this month after a northerly gale.
	26 52	79 54	48	N.	.....	.....	In the channel.
	27 20	79 30	120	N.	.....	.....	Exceptional velocity in this month after a northerly gale.
	28 32	79 50	26.4	N.	.....	.....	
	30 00	78 34	36	N.	.....	.....	
	30 31	76 07	24	N.	.....	.....	
	39 30	Bet. meridian of cape Hatteras and 60°.	62	N.	62	.....	
February	38 00	Middle of stream, 60° to 46°.	.....	.....	64 to 59	.....	
	24 04	79 50	104	N.	.....	.....	Exterior counter current to eastward of Bahamas.
	28 07	76 53	17	E. by S.	.....	.....	N. limit of the stream.
	29 04	79 22	83	N.	.....	.....	Middle of the stream.
	29 35	77 25	11	N.	.....	.....	Do.
	31 08	79 00	63	NNW.	.....	.....	
	38 40	70 40	.....	.....	44	.....	
	38 40	64 10	.....	.....	71	.....	
	39 00	Bet. 65° and 63°.	.....	.....	73	.....	
	39 36	59 03	.....	.....	66	46	
March	39 38	61 36	.....	.....	68	44	
	40 00	Bet. 60° and 54°.	.....	.....	65 to 60	.....	
	40 00	Bet. 50° and 40°.	.....	.....	59	.....	
	40 42	52 47			59.4	64	N. limit of the current.
	41 00	Bet. 68° and 63°.			44		Do.
	42 00	49 51			43	56	

GULF STREAM.

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April	35 45	72 00	43	NE. by N.	62	{ Surface.... 79° } { 80 fathoms 77° } { 100 fathoms 72° } Air, 76°.	Counter current at { From N. to S. in the N. limit. } eastern part of the. Inside of N. limit... } stream. In the stream..... } From S. to N. in the eastern portion of the stream. Outside the S. limit a counter current of 15 miles in width was found setting to the west. Near the N. limit in the stream. { In the stream. From N. to S. in the east- ern part of the stream. }
	36 30	Bet. meridian of cape Hatteras and 60°.					
	37 00	72 08	48	NE. by N.	66		
	37 32	Bet. meridian of cape Hatteras and 60°.					
	39 00	61 40			{ Surface.... 72 } { 80 fathoms 72 } { 100 fathoms 67 } 70° noon		
May	35 30	72 35	78			{ Surface.... 72 } { 80 fathoms 72 } { 100 fathoms 67 } 60 to 69	Counter current at { From N. to S. in the N. limit. } eastern part of the. Inside of N. limit... } stream. In the stream..... } From S. to N. in the eastern portion of the stream. Outside the S. limit a counter current of 15 miles in width was found setting to the west. Near the N. limit in the stream. { In the stream. From N. to S. in the east- ern part of the stream. }
	37 00	Bet. meridian of cape Hatteras and 60°.					
	41 11	58 40	16	WSW.	44		
	40 55	57 40			60		
	40 35	56 40	48	E.	68 to 69		
June	38 00	65 00	72	E.	67	{ Surface.... 72 } { 80 fathoms 72 } { 100 fathoms 67 } 60 to 69	Counter current at { From N. to S. in the N. limit. } eastern part of the. Inside of N. limit... } stream. In the stream..... } From S. to N. in the eastern portion of the stream. Outside the S. limit a counter current of 15 miles in width was found setting to the west. Near the N. limit in the stream. { In the stream. From N. to S. in the east- ern part of the stream. }
	40 00	61 40	72	E.	64		
	41 40	63 30	48	E. by S. $\frac{1}{2}$ S.			
	40 30	63 10	55.2	E. by S. $\frac{1}{2}$ S.	77 to 76		
	39 10	65 55	55.2	E. by S. $\frac{1}{2}$ S.	72		
	38 00	64 30	55.2	ESE.		{ Surface.... 72 } { 80 fathoms 72 } { 100 fathoms 67 } 60 to 69	Counter current at { From N. to S. in the N. limit. } eastern part of the. Inside of N. limit... } stream. In the stream..... } From S. to N. in the eastern portion of the stream. Outside the S. limit a counter current of 15 miles in width was found setting to the west. Near the N. limit in the stream. { In the stream. From N. to S. in the east- ern part of the stream. }
	24 00	82 20	42	E. by N.			
	24 30	83 30	20	E. by S.			
	25 00 to 28 20	New Bahama channel.	79	N.			
	25 40 to 28 20	do.....	80	N.	66 to 72		
	37 00	Bet. meridian of cape Hatteras and 60°.				{ Surface.... 72 } { 80 fathoms 72 } { 100 fathoms 67 } 60 to 69	Counter current at { From N. to S. in the N. limit. } eastern part of the. Inside of N. limit... } stream. In the stream..... } From S. to N. in the eastern portion of the stream. Outside the S. limit a counter current of 15 miles in width was found setting to the west. Near the N. limit in the stream. { In the stream. From N. to S. in the east- ern part of the stream. }
	37 51 to 39 56	61 54 to 57 26	72	NE.			
	39 00	68 00 to 63 00	30		77		
	39 56	57 26	72	E.			
	41 00	63 00 to 63 00	30		65		
	43 00 to 43 35	51 00 to 36 50	30, 25, 20	NE.		{ Surface.... 72 } { 80 fathoms 72 } { 100 fathoms 67 } 60 to 69	Counter current at { From N. to S. in the N. limit. } eastern part of the. Inside of N. limit... } stream. In the stream..... } From S. to N. in the eastern portion of the stream. Outside the S. limit a counter current of 15 miles in width was found setting to the west. Near the N. limit in the stream. { In the stream. From N. to S. in the east- ern part of the stream. }

GULF STREAM.

Table showing the velocity and direction of the Gulf stream; observed during the different months of the year.

Months.	Latitude, N.	Longitude, W.	Velocity of the current in 24 hours.	Direction.	Temperature.		Remarks.
					Water.	Air.	
July	° ' 25 00 to 27 00	° ' 0 0 In the channel..	Miles. 60	N.	° 0 0	° 0 0	
	25 00 to 28 00	do do Outside the channel	62	NNE. and NE.	.....	.....	
	28 00 to 35 00	.....	.....	.....	.....	.....	
	35 20 to 36 30	72 30 to 71 03	75	NE.	.....	.....	S. limit of the stream.
	37 00	Bet meridian of cape Hatteras and 60°.	.....	.....	66 to 72	.....	
August	37 40	68 40	86	NE. by E.	.....	.....	
	38 00	66 40	30	ENE.	.....	.....	In the counter-current.
	39 10	66 10	10	W.	.....	.....	In the stream.
	39 45	62 35	.....	.....	70 to 81	.....	
	26 00 to 28 00	In the channel..	120	N. by E.	.....	.....	
September	37 00	Bet. meridian of cape Hatteras and 60°.	.....	.....	77 to 80	.....	
	37 00	68 00 to 63 00	.....	.....	82 to 79	.....	
	38 00	57 40	48	E. by N.	.....	.....	
	25 00 to 28 00	In the channel..	72	N.	.....	83	
	35 00	Bet. meridian of cape Hatteras and 60°.	.....	.....	.....	.....	
September	37 00	do do	.....	.....	80 to 77	.....	The latitude of this limit is not indicated.
	N. limit.	do do	30	.....	74 to 71	.....	Do.
	S. limit.	do do	30	.....	83	.....	Do.
	37 45	68 00 to 63 00	.....	.....	68 to 72	.....	
	38 00	60 00 to 50 00	48	.....	79 to 82	.....	
September	40 00	60 00 to 50 00	.....	.....	80 to 79	.....	
	40 00	50 00 to 40 00	.....	.....	79 to 78 to 77	74 to 70	

October	35 00	Bet. meridian of cape Hatteras and 60°.	69 40			64 to 70	The width of the bed of the stream 71 miles; crossing the stream a counter-current was found on the S. limit, from 10 to 15 miles broad. Fucus natans; winds strong from S. to SW. and NW.; sea heavy.
	37 00		59 40	.....	.....	70 to 64	
	38 00 to 39 30		71 26 62 40	 ESE.	.....	76 to 78 76 to 77	
November	33 30 and 40 00	Bet. meridian of cape Hatteras and 60°.	60 00 to 63 00	 ESE.			Fucus natans.
	35 00		74 40	.....	.....	.....	
	35 30 38 00		74 40	 NE. by N.	.....	81 71	
December	38 30	Bet. meridian of cape Hatteras and 60°.	60 00 to 63 00	 ENE.			N. limit of the Gulf stream; a counter-cur- rent setting to WSW., 16 miles in twenty- four hours, the temperature of the water on sounding decreasing from 59° to 49° as the land is approached, and to 45° in sight of Sandy Hook. Run 200 miles in crossing the current from S. to N.
	35 00		73 40	.....	.....	74 74	
	36 14 36 30 37 00		72 25 59 40	 ENE.	.....	68 to 71	
	38 00		65 00 to 60 00	 ENE.		50 to 30	

The navigator is referred to the General Examination of the Atlantic Ocean, published by the U. S. Hydrographic Office, for detailed statements concerning the winds and currents of the Atlantic ocean, which constantly influence with greater or less force the winds and currents of the Caribbean sea and gulf of Mexico.

Slight shocks of earthquakes are very frequent among the islands of the West Indies, especially in the Virgin and Windward islands. They are sometimes strong enough to do serious damage on land, the most severe shocks having occurred at Guadeloupe and St. Thomas. The large majority of the shocks are, however, slight, their principal effect being the heavy sea waves, which frequently are seen to rise without any apparent cause, and which dash heavily against the shores of the islands. These rollers are most frequent in the eastern part of the West Indies, but occur at times on all the islands. They frequently make landing dangerous, and have been known to tear vessels from their anchorages and dash them ashore. They have been attributed to gales of wind prevailing at a distance, but more careful observation and research indicate that they have their origin in earthquake shocks.

In November, 1755, a shock, felt strongly in Boston and New York, caused very heavy rollers 20 feet high to dash on the shores of St. Martin and the islands to the southward.

It is very possible, however, that occasional gales in the Atlantic may make their effects felt in this manner, and navigators would, by noting all the attendant circumstances when these phenomena are perceived, assist greatly in finding out the laws that govern them.

CHAPTER II.

THE STRAITS OF FLORIDA WITH THE COAST FROM CAPE CAÑAVERAL TO THE TORTUGAS.

Variation in 1877:

Cape Florida, $3^{\circ} 10'$ E. | Loggerhead cay, $4^{\circ} 20'$ E.,
decreasing annually $3'$.

The straits of Florida, lying between the coast and reefs of Florida on the west and north, and the coast of Cuba with the Salt key and the Bahama banks on the south and east, form a most important thoroughfare for vessels bound from the United States and British America to Matanzas, Havana, and the ports of the gulf of Mexico, and for vessels bound from the gulf of Mexico to the United States and Europe.

The coast and reefs of Florida from cape Cañaveral to the Tortugas, with the light-houses, beacons, &c., will be generally described, followed by general directions for the navigation of the Florida strait.

From cape Cañaveral, which is low and sandy, a shallow bank, on which the sea nearly always breaks, extends about $6\frac{3}{4}$ miles in a southeasterly direction. Cape Cañaveral.

There is good anchorage, with muddy bottom, in 3 to 4 fathoms of water, sheltered from northerly and westerly winds, with the light-house bearing about NE. by N.

The anchorage is marked by an iron can-buoy with black and white perpendicular stripes. A vessel seeking anchorage should bring this buoy and the light-house in range, bearing NE. by N., and anchor when within half a mile of the buoy in 3 or 4 fathoms. Anchorage.

There is a small shoal, with 11 feet of water on it, lying SE. by E. $\frac{3}{4}$ E. $8\frac{1}{2}$ miles from the light-house. Between this shoal and the end of the sand-spit there is a 4-fathom channel nearly 1 mile wide. Cañaveral shoals.

Hetzel shoal, on which there is only 7 feet of water, lies 12 miles NNE. from the light-house, which in clear weather can just be seen from the shoal. Hetzel shoal.

Ohio shoal.

Bull shoal.

Ohio shoal lies NE. by N. $\frac{1}{4}$ N. $11\frac{1}{2}$ miles from the light-house, and the Bull shoal, with 15 feet on it, bears NE. $\frac{1}{4}$ E. 7 miles from the same point. These two shoals are quite small. $1\frac{1}{2}$ miles north of the Ohio shoal there is also a small shoal patch. In rough weather the sea breaks on these shoals, but at other times they cannot be seen, and as they are steep-to, are quite dangerous to approach.

The coast in the neighborhood of cape Cañaveral is like the cape itself, low, barren, and sandy. All along the shore as far south as Jupiter inlet a narrow lagoon extends, separated by a strip of sand beach from the sea and having inshore of it extensive cypress swamps.

From cape Cañaveral southward to Virginia cay, a distance of about 160 miles, the coast has been but partially surveyed, and shoals very probably exist not laid down on the charts. The survey of it by the U. S. Coast Survey is, however, progressing.

Houses of refuge.
n. 6.

Vessels are during the hurricane season frequently driven ashore on this coast, and as instances have been known of their crews dying of thirst and hunger, houses of refuge have been established at intervals along the shore by the United States government. These houses are of sufficient capacity to succor twenty-five persons, are furnished with ten days' provisions for that number of men, and are placed under charge of responsible keepers, who, with their families, are required to live in the houses. These houses of refuge are situated as follows:

No. 1. Thirteen miles north of Indian river inlet, lat. $27^{\circ} 38'$ N.

No. 2. Gilbert's bar, St. Lucie Rocks, lat. $27^{\circ} 15'$ N.

No. 3. Orange Grove, lat. $26^{\circ} 28'$ N.

No. 4. Fort Lauderdale, lat. $26^{\circ} 7'$ N.

No. 5. Head of Biscayne bay, lat. $25^{\circ} 51'$ N.

Cañaveral light.

From a tower 139 feet high on cape Cañaveral a white light is exhibited at a height of 139 feet above the sea, showing a brilliant white flash every minute, visible 18 miles. The tower is striped horizontally with three black and three white bands. The old tower near by is white.

From cape Cañaveral to Indian river inlet, 59 miles, the low, sandy coast takes a S. by E. direction. There is a shoal reported by Captain Pennington, of the steamship City of

San Antonio, having $4\frac{1}{2}$ fathoms of water on it, and lying 22 miles SE. $\frac{1}{4}$ S. of Cañaveral light-house. As this part of the coast has not yet been well surveyed, navigators should exercise great caution when near it.

From Indian river to Jupiter inlet, 38 miles, the coast-line has the same general direction, and continues low and sandy. Off this part of the coast there are several small shoal lumps, which will be avoided by keeping ten miles off shore north of St. Lucie inlet. At Jupiter inlet a fixed white light, varied every minute and a half by a brilliant white flash, is shown from a brick tower 94 feet high. The light is at a height of 146 feet above the sea-level. The brilliant flash is preceded and followed by partial eclipses. The light can be seen from a distance of 19 miles.

Jupiter light.

From Jupiter inlet the coast takes a southerly direction for 70 miles to Virginia cay, where the sandy shore ends and the Florida reefs commence. The coast is generally formed of sandy hillocks covered scantily with brushwood, black rocks being interspersed here and there. The shore is generally clear of danger, but off New river inlet, 15 miles north of Virginia cay, there is said to be a shoal with 3 fathoms of water on it lying 3 miles off shore. The 10 fathom line lies from 2 to 3 miles off shore along this part of the coast, the depths rapidly increasing outside of it.

From Virginia cay, in latitude $25^{\circ} 46'$ N., a chain of small islets, covered with mangrove trees, and called the Florida cays, extend to the west and southwest for nearly 200 miles, ending at the Dry Tortugas. These cays are fringed on the seaward side with a network of coral-reefs, perfectly steep-to, and extremely dangerous to the navigator in former times, but much less so now from the numerous beacons and lights which mark their positions. Between these reefs and the Gulf stream there is a narrow belt of navigable water uninfluenced, or nearly so under ordinary circumstances, by the current of the Gulf stream, and consequently frequented by steamers bound into the gulf of Mexico.

Florida cays.

As the passages inside the reefs and between the cays, although navigable for vessels drawing 6 feet or less, necessitate accurate local knowledge for their navigation, no account will be attempted of them, but to aid vessels bound along the reefs a description will be given of the artificial

Reef beacons. aids to navigation. To warn vessels of their approach to these dangerous reefs, beacons have been planted at intervals along the seaward edge of the dangers, and so marked as to distinguish them from each other. These beacons, as shown in the accompanying plate, are of iron, each of the series marking the line of the reef being surmounted by a lattice-work cylinder, the top of which is 36 feet above high water. They are distinguished by vanes marked by a letter or number large enough to be distinctly seen from a safe distance, as they may be approached from seaward within a few hundred yards.

In passing along the edge of the reefs it must be remembered that the current frequently sweeps very strongly on to the reefs; the navigator should, therefore, constantly verify his position by bearings of the beacons and light-houses.

Virginia cay is separated by a narrow cut from cay Biscayne 5 miles long, the southern point of which is called cape Florida.

Cape Florida light. On this point is situated a light-house 95 feet high, of brick, whitewashed, from which is shown a fixed white light 100 feet above sea-level, visible toward the sea, from NW. to SW., at a distance of 16 miles. This light will soon be superseded by the one now building on Fowey rocks.

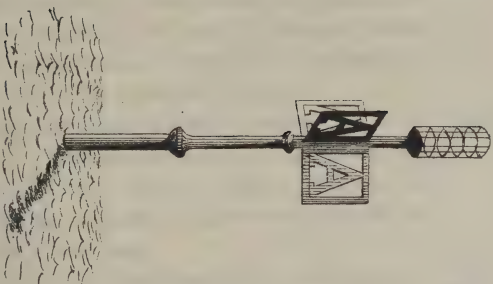
Fowey rocks. On Fowey rocks, formerly marked by beacon "P," an iron skeleton light-house is building, from which early in 1878 a first order fixed white light will be exhibited. This light-house will be 135 feet high, the focal plane of the light being 110 feet above the level of the sea. This light will be visible 17 miles.

Soldier cay. On Soldier cay, a small islet $3\frac{1}{2}$ miles west of the Fowey rocks, are the workshops and dwellings used in the construction of the light-house. There will be, hereafter, a buoy-dépôt here.

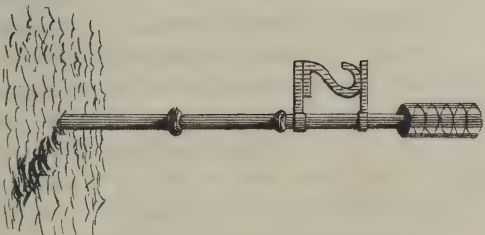
Tides. It is high water, at full and change, at cape Florida at 8^h 30^m. The tide rises and falls $1\frac{1}{2}$ feet.

Legaré anchorage. Legaré anchorage is $6\frac{1}{2}$ miles to the southward of Fowey rocks, and lies just inside of Triumph reef.

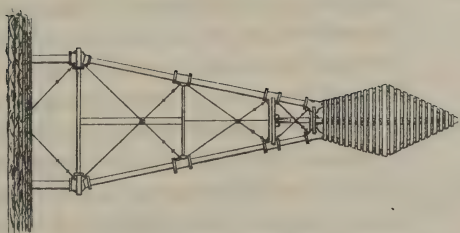
To reach the anchorage from the southward, bring the beacon on Long reef to bear west 1 mile distant, and Triumph beacon N. by W. distant 2 miles, then steer NW. by N. $\frac{1}{2}$



EASTERN SAMBO
BEACON.
36 feet high.



WESTERN DRY ROCKS
BEACON.
26 feet high.



REBECCA SHOAL
BEACON.
68 feet high.

N. to the anchorage, through a passage 600 yards wide, having 22 feet of water. To enter the anchorage to the northward of Triumph reef, bring Triumph beacon to bear SW. $\frac{1}{4}$ S. distant $1\frac{3}{4}$ miles, then steer W. $\frac{1}{4}$ S. till the Triumph and Long reef beacons are in line, when the course to the anchorage will be SW. by W. $\frac{1}{2}$ W. with 20 feet of water through a channel 800 yards wide. From the anchorage Triumph beacon bears SE. by E. distant 1 mile.

Proceeding southward from the Fowey rocks, the first beacon is on the seaward edge of Triumph reef, 7 miles S. by W. from Fowey rocks light-house. This beacon is marked "O," painted black; the shaft and vane are white and the lattice-work cylinder is red. Triumph, beacon "O."

Close to the seaward edge of Long reef and 2 miles south of Triumph beacon is Long reef beacon, marked "N," painted white; the shaft and vane are red, and the lattice-work cylinder is black. Long reef, beacon "N."

On the seaward edge of Ajax reef, and 3 miles to the southward of Long reef beacon, is Ajax beacon, marked "M." The shaft and vane are painted black; the letter is painted red, and the lattice-work cylinder is white. Ajax reef, beacon "M."

On Pacific reef, 2 miles S. by W. of Ajax beacon, is beacon "L." The shaft and vane are painted white, the letter is black, and the lattice-work cylinder is red. Pacific reef, beacon "L."

Near the northern extremity of Turtle reef, and on the southern side of the entrance to Turtle harbor, is Turtle beacon, marked "K." It lies $6\frac{1}{2}$ miles SW. by S. from Pacific beacon. The shaft and vane are painted red, the letter is painted white, and the lattice-work cylinder black. Turtle reef, beacon "K."

On Turtle harbor shoals, on the western side of the entrance to Turtle harbor and W. $\frac{1}{2}$ N., 1 mile from "K" beacon, is a beacon with a lattice-work cage surmounted by a double red cross. There is good anchorage in Turtle harbor which may be reached by passing round to the northward of beacon "K," giving it a berth of half a mile, and anchoring midway between this beacon and the one surmounted by a cross in 5 fathoms of water, muddy bottom. Turtle harbor beacon.

Three and a half miles south of Turtle reef beacon is Carysfort reef light-house, an iron pile structure 112 feet high. The tower and keeper's dwelling are painted a dark color, the lantern is white. At a height of 106 feet above the Turtle harbor.

sea-level, a white light is exhibited showing a bright flash every thirty seconds and visible 17 miles.

Elbow reef, beacon "J."

On the seaward edge of Elbow reef, $5\frac{1}{2}$ miles SW. $\frac{1}{2}$ S. from Carysfort light-house is beacon "K." The shaft and vane of this beacon is black, the letter red, and the lattice-work cylinder white.

This shoal is about 1 mile long NE. and SW., and is about $\frac{1}{4}$ of a mile wide, and lies outside of the general line of the reefs, with 4 fathoms of water between it and the main reef of Grecian shoal.

Grecian shoal, beacon "H."

On the seaward edge of Grecian shoal, $2\frac{1}{2}$ miles SW. by W. $\frac{1}{2}$ W. from Elbow cay beacon, is beacon "H," the shaft and vane painted white, the letter black, and the lattice-work cylinder red.

This shoal is on the seaward extremity of the main trend of the reef, with foul ground rather more than 1 mile outside of it.

French reef, beacon "G."

On French reef, and close to its outer edge, is beacon "G," $8\frac{1}{4}$ miles SW. $\frac{1}{2}$ S. from the beacon on Elbow key. The shaft and vane are painted red, the letter white, and the lattice-work cylinder white.

Pickle reef, beacon "F."

On Pickle reef is beacon "F," $4\frac{1}{2}$ miles SW. $\frac{3}{4}$ W. from French reef beacon. About half way between these two beacons and extending one-half a mile outside of a line drawn between them, is a point of the reef which must be avoided. Pickle beacon has the shaft and vane painted black, the letter red, and the lattice-work cylinder white.

From a point abreast of Pickle beacon and 1 mile distant a vessel under steam may safely steer for 23 miles SW. $\frac{1}{2}$ W. (by compass) along the edge of the reefs to Tennessee reef. In the night-time the ship's position should be constantly checked by bearings of Alligator reef light, to avoid being set on to the reef by the current.

Conch reef, beacon "E."

Beacon "E" is on the outer edge of Conch reef, and is $3\frac{1}{2}$ miles SW. of Pickle beacon. The shaft and vane are painted white, the letter black, and the lattice-work cylinder red.

Crocker's reef, beacon "D."

On the outer edge of Crocker's reef is beacon "D," the shaft and vane painted red, the letter white, and the lattice-work cylinder black.

This beacon lies $4\frac{1}{2}$ miles SW. $\frac{1}{2}$ W. from beacon "E."

On Alligator reef, in 5 feet of water and only 200 yards from the deep water of the gulf, is Alligator light-house, an iron-frame work of the form of a truncated pyramid, and having the keeper's dwelling 37 feet above the water. Above this dwelling is the light-tower, from which, at a height of 143 feet above the sea-level, is shown a light flashing brilliantly every 5 seconds, every sixth flash being red. The lower frame work is painted black, the dwelling and frame-work above white, and the lantern black. The light can be seen in clear weather 18 miles.

On Tennessee reef, 9 miles SW. by W. from Alligator reef light-house, is beacon "7," in 13 feet of water. The shaft and vane of this beacon are black, the figure is red, and the cage-work is black.

Close to the seaward edge of the reef, on Coffin's Patches, is beacon "C," the shaft and vane painted black, the letter red, and the lattice-work cylinder white. This beacon lies 13 miles nearly WSW. from the beacon on Tennessee reef.

Sombrero cay, or Dry bank, lies 10 miles to the westward of Coffin's Patches. On it is a skeleton iron light-house similar to the one on Alligator reef. The structure is painted brown and the lantern white, the tower being 149 feet high. From a height of 144 feet a fixed white light is shown, visible in clear weather 19 miles. The coast to the westward of Sombrero cay is clear of reefs for 12 miles, till the shoals making out from Looe cay are reached.

On the seaward edge of Looe cay, 17 miles nearly WSW. from Sombrero light-house, is Looe beacon, numbered "6." The shaft and cage of this beacon are black and the number is white.

American shoal beacon, marked "B," is on the seaward edge of the shoal, and lies $6\frac{1}{2}$ miles WSW. from Looe cay beacon. The shaft and vane of this beacon are painted white, the letter black, and the lattice-work cylinder red.

It is intended to establish a light on American shoal, and its erection will doubtless soon be commenced.

Eastern Sambo beacon lies 8 miles to the westward of American shoal, and is marked "A."

The shaft and vane of this beacon are painted red, the letter white, and the lattice-work cylinder black.

Beacon "5."

Beacon No. 5 is $5\frac{3}{4}$ miles to the westward of the Eastern Sambo beacon, and 2 miles to the eastward of the buoy marking the entrance to the main ship-channel leading to Key West harbor. The shaft and cage-work of this beacon are black, and the figure is red.

Key West harbor.

The harbor of Key West, sheltered by the reefs and keys, affords commodious and secure anchorage to vessels of any size. The island on the western end of which the town is situated is low and sandy, $3\frac{1}{4}$ miles long 1 mile wide, and covered with brush. The town is an important commercial place, with about 3,000 inhabitants. Supplies of all sorts, coal, ice, and fresh provisions can be obtained here at all times. Tow-boats, steam-pumps, lighters, anchors, &c., to assist vessels ashore or in distress, are always ready. There is no dock here, and vessels whose bottoms need repair must be docked at Havana or hove down to a wharf.

There is telegraph communication between Key West and the Northern States and with Havana. There is a United States naval store-house and coal-depot here. Steamers running between New York and Galveston and between New Orleans and Havana touch here *en route*.

Entrance channels.

There are numerous channels leading between the reefs to the harbor of Key West, but most of them need local knowledge. The entrance by the main ship-channel or by the western channel is, with the assistance of the Coast Survey chart, perfectly easy and safe.

In placing buoys for the assistance of navigators, the following system has everywhere been adopted by the United States Light-House Board:

1. In approaching the channel, &c., from seaward, red buoys with even numbers will be found on the starboard side of the channel, and must be left on the starboard hand in passing in.

2. In approaching the channel, &c., from seaward, black buoys with odd numbers will be found on the port side of the channel, and must be left on the port hand in passing in.

3. Buoys painted with red and black (horizontal) stripes will be found on obstructions, with channel-ways on either side of them, and may be left on either hand in passing in.

4. Buoys painted with white and black perpendicular

stripes will be found in midchannel, and must be passed close-to to avoid danger.

Near the southwest point of the island of Key West is a white light-house, 60 feet high, from which a fixed white light is shown, visible 14 miles in clear weather. Key West light.

To enter the main ship-channel, bring Key West light-house to bear north, and steer for it till Sand Key light-house bears W. $\frac{1}{2}$ S.; then steer N. $\frac{1}{4}$ W., passing just to the eastward of the entrance buoy. This course continued $2\frac{3}{4}$ miles will lead to the westward of Mississippi shoal and the eastern Triangle (both marked by red buoys) and to the eastward of the Western Head rock and the western Triangle, (marked by black buoys.) After passing these buoys a NW. $\frac{1}{2}$ N. course will lead just to the westward of the red buoy on Whitehead spit. Large vessels should anchor off Fort Taylor, where good holding-ground in 5 fathoms of water will be found; $4\frac{3}{4}$ fathoms is the least water on the courses indicated. Main ship-channel.

At night, bring Key West light-house to bear north, or, if clear, directly under the North Star, and steer for it until Sand Key light bears SW. by W. $\frac{1}{4}$ W. Then anchor in 6 fathoms of water and wait for daylight or for a pilot.

A dangerous coral head with only 13 feet of water on it lies 400 yards WSW. from the entrance buoy.

On the Eastern Dry Rocks, about 2 miles westward from the entrance buoy, is beacon "4," the shaft and cage being painted black and the figure white. Eastern Dry Rocks, beacon No. "4."

A little more than 4 miles to the westward of the ship-channel entrance-buoy is Sand Key light-house, an iron pile structure 121 feet high, painted brown. It shows for a space of one minute a clear white light with a brilliant flash of 10 seconds' duration in every alternate minute, preceded and followed by partial eclipses lasting 25 seconds each. Sand Key light.

The light is 110 feet above the sea-level, and can be seen at a distance of 17 miles in clear weather.

On the Western Dry Rocks is beacon "2," $2\frac{3}{4}$ miles to the westward of Sand Key light. The shaft and cage of this beacon are black; the figure is white. Western Dry Rocks, beacon "4."

The Middle ground is formed by two shoal patches about 1 mile long east and west and half a mile wide, lying $1\frac{3}{4}$ miles north of Sand Key light house, and marked by a bea- Middle-ground beacon.

con numbered "3." The shaft and cage are painted black ; the figure is red.

Western channel.

To enter the western channel, bring Key West light-house to bear NE. by E. and steer for it. On this bearing it will be open a very little to the eastward of Fort Taylor. Keep it on this range till the beacon on the Middle ground is passed, when haul up NE. by E. $\frac{1}{2}$ E., and keep this course till the NW. angle of Fort Taylor is on with the Lazaretto. Steer in on this range till past Whitehead spit buoy, and then haul up for the wharves and anchor as convenient. The least water on these lines is 5 fathoms.

NW. passage.

The channel leading from Key West harbor into the gulf of Mexico can be used by vessels drawing not more than 12 feet.

To use it safely, local knowledge or the assistance of a pilot is necessary.

NW. light.

There is an iron screw-pile light-house placed on the flats $6\frac{3}{4}$ miles NW. $\frac{3}{4}$ W. of Key West light-house to mark the channel of the bar leading to the northwest channel. It shows a fixed white light 40 feet above the sea level, and visible from SE. by E. to SW. for a distance of 12 miles.

Tides.

It is high water at full and change at Key West at 9^h 22^m, the average rise and fall of the tide being sixteen inches.

Between Key West and the Marquesas keys, 16 miles to the westward, there are numerous small keys and islets lying on a shoal bank. The passages between these keys are only navigable for boats. This shoal bank, called the Quicksands, extends for 17 miles to the westward of the Marquesas keys, leaving a passage 18 miles wide between these keys and the Dry Tortugas, a cluster of low islets lying 55 miles to the westward of Key West. This passage is, however, obstructed by the Rebecca shoal, with only 7 feet of water on it, lying 6 miles to the westward of the west end of the quicksands, and 16 miles E. by S. from Fort Jefferson. On the Rebecca shoal is an iron pile-beacon (see plate, page 16) 68 feet high. One and a half miles to the south-east is a small patch called the Isaac shoal.

Vessels should take the passage between the Rebecca shoal and the Tortugas rather than that east of the Rebecca shoal, and should keep at a distance of 2 miles from the beacon.

The Tortugas keys, frequently called the Dry Tortugas, form a cluster of low sandy islets, rising from a bank of coral and sand, about 10 miles long NE. and SW., and 4 to 5 miles in breadth. On Garden cay, one of the easternmost of the islets, is Fort Jefferson, a large brick fortification, not garrisoned at present. From an iron tower on the SE. bastion of the fort a fixed white light is shown at a height of 70 feet above the sea, and visible 14 miles. The keys are generally bare of vegetation. Bush cay has, however, a scanty growth of brush upon it.

Tortugas Keys.

Garden cay light.

There are numerous excellent anchorages among the cays, and, as this neighborhood is constantly frequented by fishermen who supply the Havana market, pilots may be readily obtained. If temporary shelter only is required it may be reached by bringing Loggerhead cay light to bear north, distant 4 miles and steering for it till Garden cay light bears NE. by E. when good holding-ground will be found in 10 fathoms of water and sheltered from northerly and easterly winds. Loggerhead cay is nearly 1 mile long, NE. and SW., and 700 feet wide, and is bordered by low bushes. From both its northern and southern ends shallow sand-spits extend for a distance of nearly 2 miles, having one or two spots nearly or quite bare at low water.

About the middle of Loggerhead cay is a brick light-house, 150 feet high, the lower half white and the upper black. From it, at a height of 152 feet above the sea-level, a fixed white light is shown, visible in clear weather at a distance of 19 miles. The light-house tower has been seriously damaged by a hurricane, and will be shortly replaced by an iron one, 150 feet high.

Loggerhead cay light.

It is high water, full and change, at Loggerhead cay at 9^h 56^m, the rise and fall of tide being 1 foot 2 inches.

The Tortugas bank is an irregularly shaped coral bank about 3½ miles in diameter, its centre lying 7½ miles west of Loggerhead cay. The least depth on it is 6½ fathoms.

Tortugas bank.

The navigation of the straits of Florida has always been considered difficult and dangerous, and justly so, till the establishment, within the last few years, of beacons and lights along the Florida reefs. At the present time, with the exercise of ordinary care and prudence, there is no danger

Navigation of the Straits of Florida.

to be feared except the encountering a hurricane without sufficient sea-room to drift.

The annual number of wrecks on the reefs has very greatly diminished since the present excellent system of lights and beacons has been established, so that the numerous wreckers who formerly constituted a large proportion of the inhabitants of Key West have been driven to seek other means of livelihood. It may be truly said that nearly all of the cases of vessels grounding on the Florida reefs are due to ignorance, carelessness, or, as the records of the admiralty court at Key West indicate, to wilful running of vessels on shore to defraud underwriters.

With the exception of a small space off the American shoal a vessel cannot now, in ordinary weather, approach within 5 miles of the reefs in the night-time without sighting a light, and in the day-time the vicinity of danger is indicated in ample time by the change in the color of the water.

It must be borne in mind while in the vicinity of these reefs that the Gulf stream, influenced by the wind, frequently sets strongly onto the reefs, especially in the space between the Alligator and Carystort reef light-houses. For this reason vessels when beating up the straits should not stand close in shore in the night-time, especially in thick weather.

Under the usual circumstances of wind and weather, that is, with a NE. wind and the Gulf stream running two or three knots, the navigation of the straits by steamers and by sailing-vessels is entirely different. They will therefore be considered separately.

Steamers bound
south.

The numerous steamers running between the northern ports of the United States and the gulf of Mexico on their outward passage generally steer a course to pass cape Cañaveral at a distance of from twelve to fifteen miles; in thick weather or in the night sounding frequently and taking care not to shoal the water to less than 11 fathoms. From abreast of this light a course S. by E. $\frac{1}{4}$ E. (magnetic) may be steered for 73 miles, keeping in not less than 12 nor more than 16 fathoms till Jupiter inlet light is seen from the deck, when the ship may be hauled in toward it till a depth of 5 or 6 fathoms of water is reached, $\frac{3}{4}$ of a

mile or 1 mile off shore. This distance off shore may be preserved safely in the day-time from Jupiter inlet to Hillsboro' inlet, 40 miles to the southward, but as the shore curves outward here, care must be taken in the night-time not to come too close, and a depth of 10 fathoms had better be kept, which will carry the vessel about 2 miles off shore. From Hillsboro' inlet to the northern end of the reef a south course (magnetic) may be steered.

The new light-house now building on the Fowey rocks will be a very valuable aid to navigation, as all dangers between it and the north end of Virginia cay lie to the westward of a line drawn north from it.

In coasting along the reefs in the day-time the beacons may be passed at a distance of 500 to 800 yards, but in the night a vessel should haul off shore as soon as Cape Florida light is made, until abreast of Fowey rocks, whence she can run on courses parallel to the reefs at a distance of 1 or $1\frac{1}{2}$ miles, constantly checking her position by bearings of the lights, as they are made and passed.

Vessels bound to Havana generally shape a course for that place when abreast of Alligator reef light, but those bound to Key West or the gulf of Mexico continue their course between the Gulf stream and the reef.

Captain Timmerman, commanding the steamer City of New York, a very skilful and experienced navigator, says: "My experience has been that from Fowey rocks to Carysfort reef the Gulf stream runs parallel to and seldom more than $\frac{3}{4}$ of a mile from the general line of the reefs; but with fresh easterly breezes, which are the prevalent winds, the current runs close to the reef, the color of the water almost invariably marking its edge. To the westward and southward of Carysfort reef, the line of no current gradually widens until abreast of Alligator reef, where it is about two miles wide, or even wider, with northerly winds. From abreast of beacon 'E' on Conch reef, there is frequently with northerly winds a strong westerly current between the Gulf stream and the reef." The courses and general directions here given must, of course, be somewhat modified according to circumstances of wind and weather.

Steamers bound to the northward will find it advantageous to pass the lights on the Florida reefs and coast at such

Vessels bound
to Havana.

Steamers bound
north.

a distance that they can be just seen from the deck. This course will give them the full strength of the favoring currents and will enable them to frequently verify their position, a point which cannot be too urgently insisted upon.

Sailing-vessels
bound south.

Sailing-vessels bound from ports in Europe, or from the Atlantic ports of the United States or British America, to the gulf of Mexico, and intending to pass to the westward of the Great Bahama bank, shape a course for the southern end of Abaco island, generally known as the Hole in the Wall. (See page 31.) Hauling to the eastward between the south end of Abaco and the north side of the Great Bahama bank, those vessels drawing not more than 12 feet may safely cross the bank, leaving its western edge at a point about 15 miles south of Orange cay. (For directions for crossing the bank see page 109.) Vessels drawing more than 12 feet keep on to the westward through the NW. Providence channel between the Great and Little Bahama banks, haul round the Great Isaacs light-house at a distance of 3 or 4 miles, and follow down the western edge of the bank to a point about 15 miles south of Orange cay. (For a description of this part of the bank see page 112, *et seq.*) The wind is generally from the eastward so that the water is smooth, but vessels becalmed are sometimes carried helplessly by the Gulf stream to the northward of the Little Bahama bank and have to make the best of their way to the Hole in the Wall again.

From the edge of the bank 15 miles south of Orange cay a course should be steered to pass close along the northern edge of the Salt cay bank, and having passed Elbow cay light (see page 116) haul over for the Pan of Matanzas and coast along the Cuba shore at a distance of 3 or 4 miles till well to the westward of the Tortugas, when a course may be shaped for the port of destination.

Vessels bound to Key West would of course haul to the northward sooner, being governed by the strength and direction of the wind in choosing a point to cross the Gulf stream.

Sailing-vessels
bound north.

In passing to the eastward and northward through the Florida straits, sailing-vessels with a fair wind would of course follow the track used by steamers, skirting the circles of illumination of the lights along the reefs. As, how-

ever, the wind generally blows from between NE. and east, it is almost always necessary to beat for a portion of the way at least, and it is while by the wind on the starboard tack that most of the wrecks take place.

With the exception of a space of 5 miles abreast of American shoal, (where a light-house is soon to be erected,) there is not a point where in ordinary weather a vessel can get within 5 miles of the reef without being within sight of a light. While beating up through the stream, if a vessel cannot get hold of some landmark along the reefs during the afternoon she should not approach the Florida shore after dark in thick weather, but remembering that the current frequently sets strongly over the reefs, the vessel should be kept under short sail on the off-shore tack during the night. By complying with this simple precaution the much-dreaded navigation of the Florida strait will be deprived of all its dangers, which were formerly considered so great, that vessels were instructed to keep entirely away from the Florida side of the channel.

CHAPTER III.

THE BAHAMA ISLANDS AND BANKS.

Variation in 1876.

Turk's island, 1° 20' E.	Watling's island, 2° 0' E.
Great Abaco I., 2° 30' E.	Salt cay, 4° 10' E.

The Bahama islands were first settled in 1629 by the English, who were in 1641 driven away by the Spaniards. Until 1783 they frequently changed masters, but since that time they have remained British possessions. Until 1848 they were under one government, but Turk's island and the Caicos are now attached to Jamaica. The larger islands are inhabited, the population being, in 1871, 39,162.

This remarkable group is composed of numerous irregularly-shaped, white sandstone islets and rocks, thinly wooded, the loftiest about 400 feet high, most of them under 100 feet, and many only a few feet above the surface of the sea. They are generally situated on the edges of coral and sand banks, some of which are of the most dangerous character. One or two of the largest islets are clothed with wood of moderate dimensions, of sufficient size for the scantling of vessels of from 150 to 200 tons burthen. Brazilletto, yellow wood, lignum-vitæ, and fustic are exported in small quantities. The soil in general is of so light and stony a character that the vegetation is scanty, and it is only capable of producing fruit, Indian corn, and vegetables. Cotton was at one time a valuable article of commerce, but it is not now cultivated to any large extent.

The most important product is salt, which is raked in great abundance at many of the islands. Fruit and a coarse description of sponge are also largely exported. Good water is rather scarce, and on some of the islands the inhabitants depend chiefly on rain-water. Poultry is readily obtained at most of the inhabited islets, but cattle are scarce, although generally obtainable at Nassau; the breed of sheep is excellent. A most remarkable feature is the exceeding clearness of the sea-water, which enables the bottom to be seen, from aloft, at considerable depths, and at some

distance; the navigation of the banks is consequently conducted almost entirely by the eye, but care must be taken not to run with the sun ahead of the vessel.

The space occupied by the whole group is somewhat triangular in form. Commencing at the Navidad bank at the southeast end, the south side trends about W. by N. for 600 miles; the north side NW. by W. 720 miles; and the west side N. by W. 200 miles.

The Bahama islands are all within the influence of the trade-winds. Their lowness, of course, exempts them from the regular land-wind, but in the summer season a light breeze frequently comes from the Florida shore in the night, and reaches the western side of the Little Bahama bank, but no farther. At this period the wind generally prevails to the southward of E., and the more so as their northwest extreme is approached; the weather is then very variable, and squalls rush down with great violence, accompanied with heavy rains and an oppressive atmosphere. They are within the zone of hurricanes, and a year seldom passes without their being visited by a heavy gale at least, from the SE., which inflicts serious damage both on shore and at sea.

In the winter months, from about November to the middle of March, the trade-wind is frequently interrupted by NW. and N. winds. In December and January this may be expected almost weekly. Previously to this change the wind will draw round to the S. and SW. About 24 hours after, or less, dark masses of cloud will be seen rising from the westward, and in a short time the wind will rush suddenly from that quarter with the force of a double or treble-reefed topsail breeze. It will soon veer round to NW. and N. with clear weather, and remain between these points two or three days. It will then haul gradually to NE., perhaps with increased force, accompanied by heavy squalls, and wear itself out at E. in the course of a few days.

The barometer is scarcely any guide; a small fall may be detected as the wind draws to the S., and it will rise rapidly with the N. wind. The mariner may be sure of the action of the wind, and that it will not back at this period, and this will enable him to seek shelter if necessary with every confidence in the change that will follow. On the southern

edge of the group this change may be more sudden, on account of the partial interference of the winds from the high lands of Santo Domingo and Cuba on the regular trade; but it seldom takes place without a previous indication of dark masses of clouds to the westward.

Current.

A feeble stream, seldom exceeding half a knot, generally sets to the westward on the S. side of the Bahama islands and to the NW. on the NE. side; but it is liable to change, and often suddenly, especially in the Northwest Providence channel, and on the NE. side of the Little Bahama bank. Here it will sometimes be found running strong to windward. Some observations tend to show that this is more frequently the case after northers, or on the increase of the moon. The opinions of the wreckers and Cayman fishermen appear to agree on these points; but there is no certainty in the matter, and, consequently, more than ordinary attention is required when navigating among the islands.

Tides.

It is high water, full and change, nearly everywhere in the Bahama group, at 7^h 40^m; springs rise 4 feet, neaps 3 feet; the only exception will be seen on the west side of Andros island. The tidal stream runs directly on and off all the banks at the rate of from 1 to 2 knots, except in the narrow channels between the cays on the Great and Little banks; here its velocity is greatly increased, and in some places it is scarcely possible to contend against it.

Bank blink.

This is a phenomenon described as a bright reflected light hanging over the clear white sand-banks, and serving to point them out from a long distance. From lengthened experience, however, we warn the navigator most strongly not to trust to so fallacious a guide. It will be far better for him to depend upon the eye from aloft, the lead, the reckoning, and especially the latitude, which should be unremittingly checked.

LITTLE BAHAMA BANK.

The Little Bahama bank is of irregular shape and lies to the northward of the Great Bahama bank, from which it is separated by the NW. Providence channel. In a NW. and SE. line this bank is about 140 miles long, but varies in breadth from 30 to 50 miles.

Great Abaco island is the largest of the numerous islands which skirt the Little Bahama bank on all sides but the northwest and west; it rises on the eastern side of the bank, and is inhabited. It is nearly 70 miles in length, and in some parts 15 in breadth, but it tapers at both ends. The southeast extreme is 2 miles in breadth, and 90 feet high; at the eastern end of this headland there is a small, narrow tongue of low, flat rock, which projects about 300 yards to the southward, and close off it a very small rock. This remarkable point is called the Hole in the Wall, from the sea having worn a large arch through the rock, which is visible about three miles off, from SSW. to WSW., and the opposite bearings. A narrow spit runs out southeast 5 miles from this point, with a depth of from 9 to 15 fathoms; from its southeast extreme the light-house bears NW. $\frac{1}{4}$ W.

Great Abaco I.

About 800 yards northward of the Hole in the Wall is a conical stone tower, 85 feet high, with the lower part painted white and the upper red. It exhibits a white light which revolves every minute, and is visible from seaward when bearing from SW. round to ESE. The light is 160 feet above the sea, and in clear weather may be seen 16 miles.

Light.

Anchorage in 10 fathoms will be found on the west side of the southwest point of Abaco, three-quarters of a mile from the shore, with the light-house bearing E. by N. $\frac{1}{2}$ N.

From the Hole in the Wall the eastern shore of the island trends N. $\frac{1}{2}$ E. 15 miles, rising gradually to the height of 120 feet, and the sandy beach which borders it is steep-to. Thence the coast bends in, forming a deep bight 8 miles wide, called Cheerie sound, which is everywhere foul, except at the northeast corner, where, with local knowledge, there is shelter for small coasters. The coast then takes a NNE. direction 7 miles to East point, a remarkable sandy bluff, NNE. 30 miles from the light-house. The coast-line here becomes exceeding irregular, and is skirted by numerous small cays, between which are several narrow openings, navigable for wreckers and vessels of light draught. The first opening lies about 400 yards northeast of East point, and 13 feet may be carried through it into Little harbor.

Cheerie sound.

Little harbor cay, the first of the islets, lies about $1\frac{1}{4}$ miles northward of the sandy bluff, and is $2\frac{1}{4}$ miles in length north and south; the reef extends half a mile off shore, and

Little harbor
cay.

there are 10 or 12 fathoms water the same distance farther out. About 400 yards from the north end, between it and Channel rock, there is another small cut, which carries a depth of 15 feet and leads into Pelican harbor; but all these places are too difficult for a stranger to enter without a pilot.

Pelican and Abaco cays, next to the northward, are skirted by the reef the same distance off shore as at Little harbor cay.

Tides.

It is high water, full and change, in Pelican harbor at 7^h 30^m, and the rise is 4 feet.

Little Guano cay.

Little Guano or Elbow cay is separated from Abaco cay by a narrow channel; at its north end is a high sandy bluff, and about a mile to the southward of the bluff there is a small settlement. This islet is at the northeast extreme of the Little Bahama bank, and a reef stretches off nearly 3 miles to the northeastward; it is one of the most dangerous and fatal elbows in the Bahamas.

The Elbow reef cay lies in a N. by E. $\frac{3}{4}$ E. direction 48 miles from Abaco light, and in thick weather is likely to pick up all vessels bound to the southwest should they happen to fall to the westward of their reckoning. It is therefore advisable for a vessel to strike the parallel of 26° 30' N. well to the eastward of the cay. Should the wind be to the southward, when in this neighborhood, and the light not in sight, or the reckoning doubtful, it will be prudent to keep the vessel's head to the eastward in the night, as the lead will not give sufficient warning of the danger. The current generally sets to the northwest and the tides run through the openings at the rate of 2 to 3 knots.

Light.

On Elbow cay is a circular stone tower, 77 feet high, with red and white bands, which exhibits at 123 feet above the sea a fixed white light, visible in clear weather 15 miles.

Man-of-war cay.

From Elbow cay the range of small islets takes a NW. by W. direction for more than 100 miles, and skirts the shore of Abaco at the distance of from 3 to 6 miles. Four miles to the NW. of Elbow reef is Man-of-war cay, which is about 3 miles in length NW. and SE., and southward of it are some small, low cays called the Guano rocks.

The Elbow reef sweeps round these islets at the distance of about 3 miles and joins the northwest end of Man-of-war

cay, leaving an opening from a half to a quarter of a mile wide, with a depth of 14 feet between it and the reef, which commences again to leeward. The channel lies close to the eastward of some small rocks nearly half a mile NNW. from the cay, as there is a small rocky head to be avoided lying about 400 yards northwest from the end of the cay. There is good shelter within, about half a mile from the cay; and a snug harbor for coasters drawing under 12 feet, off the main land about 6 miles SW. of the opening. In a case of absolute danger a vessel of the above draught may save herself by running in here, but, without local knowledge, it would be attended with very great risk.

It is high water, full and change, at Man-of-war cay, at 8^h 10^m and the rise about 4 feet. Tides.

About 8 miles farther to the northwest there is another opening between Whale and Green Turtle cays, and it may be somewhat readily discovered by the remarkable high sandstone cliffs on Whale cay, and by some, equally conspicuous, on Guana cay 3 miles eastward of it. There is no other land near this spot of similar appearance. There are two channels through, one between Whale cay and Channel rock, which lies a mile to the northwest, with 13 feet water in it, and named Southeast channel; and the other to the westward of the rock, named Northwest channel, about 400 yards wide and 3 fathoms deep, but the eye must be the guide. The sea breaks heavily on the edges of the reef in strong NE. gales, and the breakers on either side serve to point out the opening.

Whale cay.

There is a settlement on the SW. end of Green Turtle cay, where wood and water may be obtained.

Walker cay, about 65 miles from Green Turtle cay, is the westernmost of the Grand cays, and is woody and 55 feet high. The islets between are skirted, to the distance of from 3 to 4 miles, by a solid reef, which presents no safe opening whatever. Between the cays and Abaco there is a passage, through which may be carried 12 feet water to the western part of the Little Bahama bank, entering by Whale cay channel.

Walker cay.

From Walker cay the Matanilla reefs, on which the sea breaks in moderate weather, run in a W. by N. direction 28 miles, and being steep-to are extremely dangerous. The

Matanilla reefs.

W. end of the reefs terminate on the meridian of about $78^{\circ} 50'$ W., in latitude $27^{\circ} 23'$ N., and from this point the edge of the bank trends W. by N. 16 miles to its NW. end in latitude $27^{\circ} 24'$ N., longitude $79^{\circ} 8'$ W. At $7\frac{1}{2}$ miles westward of the breakers there is a coral knoll 2 miles long N. and S., called Middle shoal. At its N. end there are $4\frac{1}{2}$ fathoms water a mile within the edge of the bank, and on the S. side only 2 fathoms. The ground between it and the reef is also foul.

Matanilla shoal. A dangerous coral patch, called Matanilla shoal, lies 4 miles westward of Middle shoal, 2 miles within the northern edge of the bank and $3\frac{1}{2}$ miles from the northwest extreme, and at 5 miles WSW. of it the bank will be struck in 13 fathoms. The patch is not half a mile in extent, and on one small spot there are only 12 feet. All this part of the bank is extremely dangerous. The bottom being rocky and covered with dark weed, the water is not discolored, and the shoals do not break; and the rock is so flat that no dependence can be placed on anchors.

Tides.

The tidal streams run on and off the Little Bahama bank, and near the edge are at times strong. The current in the offing is very uncertain for some distance to the northward.

From the northwest extreme the bank takes a SSW. direction about 15 miles, when it reaches its outer western limit in latitude $27^{\circ} 10'$ N. and longitude $79^{\circ} 13'$ W. About $3\frac{1}{2}$ miles northward of this point is the southwest end of a narrow sand-ridge 4 miles long, with from 10 feet to $3\frac{1}{2}$ fathoms on it, which comes within half a mile of the edge, and may be seen some distance from aloft. Thence the edge of the bank sweeps round to the S. and SSE. 30 miles to the west end of Bahama island.

The whole of this part is closely skirted by narrow, shallow sand-ridges and detached coral patches, and is extremely dangerous. The Florida stream strikes the edge of the bank sideways, with a strength of from 2 to 3 knots, and the lead gives scarcely any warning. There are small openings here and there with 3 and 4 fathoms water in them, and in a case of absolute danger a vessel might be guided by the eye into safety on the bank, but she would run imminent danger of shipwreck.

Memory rock is a little dark, barren, rugged islet, only 14 feet high, lying NNW. $16\frac{1}{2}$ miles from the west end of Bahama island, about midway between it and the western limit of the bank, and $\frac{3}{4}$ of a mile within its edge, in latitude $26^{\circ} 57'$ N., and longitude $79^{\circ} 7'$ W. At three miles NW. of it there is a most dangerous small coral patch, on which the sea generally breaks. Between the rock and patch there are from 3 to 4 fathoms water, about a mile within the edge of soundings, under the lee of a sand-ridge, on which there are 2 fathoms. To the southward of the rock there is no safe opening for vessels drawing over 12 feet. The edge of the Florida stream comes generally close home to the rock. Between it and Bahama island vessels are only influenced by the tides, which set regularly on and off the bank at the rate of from a half to a knot an hour.

Memory rock.

At Memory rock it is high water, full and change, at 7^h 50^m, but at Walker cay it is not high water before 8^h 50^m. Springs rise about 3 feet.

Tides.

Sandy cay is very small and covered with bushes to the height of 14 feet above the sea. It lies N. by W. 7 miles from the west end of Great Bahama, and 3 miles within the edge of soundings. A narrow sand-spit, awash, runs off nearly 3 miles to the WNW.; and to the WSW. of it, on the edge of the bank, there is a very dangerous coral ledge which shows at low water.

Sandy cay.

Wood cay, about $3\frac{1}{2}$ miles south of Sandy cay, is a rocky islet, woody, half a mile long, and 26 feet high. Clear soundings extend out from it about half a mile, and there are $5\frac{1}{2}$ fathoms close under the west side.

Wood cay.

Indian cay lies close off the northwest point of Bahama island, leaving between a channel for small craft drawing 6 feet, round to the settlements on the north side of the latter island.

Indian cay.

Bahama island is 65 miles in length east and west, and from 5 to 7 in breadth. It is inhabited, thickly wooded, but generally level, and about 40 or 50 feet high. At Settlement point, the west end, it is a mile broad, north and south, and anchorage will be found under it in 8 or 9 fathoms water, about half a mile off shore, with the northwest point bearing

Bahama island

NE. by E., and the southwest point SSE. $\frac{1}{4}$ E., but a vessel must quit the moment the wind threatens to change.

From Settlement point the southern shore trends SE. by E. 22 miles to SW. point. Soundings appear to extend off a short distance, and anchorage is marked on the chart under the latter point—but this part of the island is very little known. Thence the coast line takes an ENE. direction, and toward the east end of the island sweeps round to the southward, forming a deep and dangerous bight, with southerly winds. This part appears to have a foul shore the whole way, without any anchorage; but it is also very imperfectly known. From the southeast extreme of the island the edge of the Little Bahama bank trends to the south and round to the southeast, and connects itself to the west side of Abaco at Rock point. It is closely skirted by numerous small islets and dangerous ledges without any navigable openings between them, as far as Gorda cay, which lies NW. by W. 9 miles from Rock point.

Water.

There is a well on Gorda cay, and anchorage under the west side. There is also water to be found abreast the anchorage under SW. point of Bahama island.

From the southeastern extremity of the Great Bahama bank a chain of islets, cays, and banks extend in a southeasterly direction nearly to the Mona passage. The passages between these cays and banks afford clear and convenient channels, especially for vessels voyaging between ports in the United States and the western part of the Caribbean sea.

The most easterly of these banks is called the Navidad bank. This is an oval-shaped flat bank of coral and sand, 22 miles long in a north and south direction, and in the centre 11 miles broad, with a depth of from 11 to 20 fathoms. The south end lies NNE. 32 miles from cape Cabrou, the nearest part of Santo Domingo. The water is not sufficiently discolored to render this bank visible.

Between the Navidad and Silver banks there are three small detached knolls, steep-to, with 10, 12, and 17 fathoms water on them. The supposed position of the Severn shoal is still shown on the charts, but the neighborhood has been so closely searched that its existence is extremely doubtful.

Silver bank lies 36 miles to the northwest of the Navidad, and 35 to the northward of cape Francés Viejo. Its eastern side is 29 miles long in a NE. by N. and SW. by S. direction, but bends westward near the middle, and at the bottom of the bight, near the edge, there is a dangerous shoal; its southeast and northeast points appear to have no dangers, but regular soundings from 12 to 15 fathoms.

The north side of the bank runs nearly straight NW. by W. $\frac{1}{2}$ W. for 33 miles; but about 8 miles from the northeast point it becomes exceedingly dangerous and continues so all the way to the northwest point; and near the middle of this side rocky heads, which are awash, extend 5 miles inward from the edge. The west side also runs nearly straight north and south 37 miles, on the meridian of 70° W., and 8 miles from the southwest point there is a foul patch close to the edge of soundings; but to the northward of this, to within about 7 miles of the northwest point, the bank appears to be free of danger for some distance inward.

From the southwest point the south side trends E. by S. 24 miles, and for about the first 8 miles of this distance the edge is very dangerous; but to the eastward of this it appears to be clear; it will be better, however, not to venture on any part of the bank, for it has not been closely examined. As the water on the bank is not discolored, except over the shoals, where it has a white appearance, the lead must be well attended when approaching it from any quarter.

A $2\frac{1}{2}$ -fathom spot has for many years been shown on the charts in lat. $20^{\circ} 33'$ N., long. $70^{\circ} 10'$ W. This shoal was diligently sought for by Commander R. L. Phythian, U. S. N., commanding U. S. S. Nipsic, in April, 1873, but without success. Commander Phythian says:

"Eight days were spent in searching for this rock, frequently running over and near its assigned position, lat. $20^{\circ} 33'$ N., long. $70^{\circ} 10'$ W., without obtaining soundings or discovering indications of shoal water.

"Irregular currents were experienced on and near Silver bank, the general set being to the westward. Frequently a strong westerly current was felt near the edge of Silver bank, which decreased rapidly in strength as the ship stood to the westward, and at a short distance from the bank was scarcely perceptible."

Mouchoir bank. Mouchoir bank or Mouchoir Carré (square handkerchief), lies 28 miles westward of the northwest point of Silver bank, and is 31 miles in length east and west, but irregular in breadth. The southern edge takes nearly a W. by N. direction, and, with the exception of a shallow patch 4 miles within it, appears to be free of danger, having a depth on it of from 9 to 14 fathoms. The eastern side trends northerly 20 miles, and terminates in a long point, or narrow spit; about $1\frac{1}{2}$ miles within the extreme end of the spit there is a small breaker. The outline of the north side is irregular and extremely dangerous to within about 9 miles of the west end, where there is a patch of 6 fathoms. The rocky heads at the northwest extreme of the bank lie about SE. $\frac{3}{4}$ S., 21 miles from East cay of the Turk islands group.

Turk islands. Turk islands are the easternmost of the Bahama group, and rise from a narrow bank extending about 35 miles NNE. and SSW. Near the centre of the bank, however, a tongue of soundings extends eastward $7\frac{1}{2}$ miles from East cay, with a regular depth on it of from 8 to 10 fathoms. The nine islets of the group are composed of sand and sandstone, partially clothed with stunted bushes, and a peculiar species of cactus, somewhat in the form of a Turkish cap, hence, probably, their name. There are no wells; and the inhabitants who reside on Grand Turk island and Salt cay depend upon rain-water caught in tanks. The Caicos islands furnish them with ground provisions; Santo Domingo, with cattle; and other supplies are generally obtained from the United States; so that strangers must not depend upon finding resources here.

Grand Turk island. Grand Turk island is $5\frac{1}{2}$ miles long, in a north and south direction, and about a mile broad. It is low, except on the east side, which is formed by a narrow ridge of sand-hills, about 70 feet high. A dangerous reef extends NE., $2\frac{1}{2}$ miles from the north point, and a narrow ledge of the bank, on which there are from 6 to 40 fathoms, runs off six miles farther. The reef skirts the eastern shore at the distance of about $1\frac{1}{2}$ miles, and connects itself to the small islets lying to the southeast as far as East cay. This little islet, which lies about 5 miles SSE. of Grand Turk, is 96 feet high, and the loftiest of the group. The reef is broken here and there, but there is no safe passage through for strangers.

The northwest point of Grand Turk is also foul for half a mile, and a narrow ridge of soundings runs off, a mile outside the reef. The town, which is the seat of government, stands on the western shore, and in front of an extensive salt-pond.

The anchorage for vessels loading salt is off the centre and south end of the town, but so close to the shore that it will be better for strangers to take a pilot. The shore is also foul all along this side of the island, and there is deep water half a mile from the shore. The difficulty in using this anchorage is in shooting in, which requires great judgment; in a sailing-vessel, the better way will be to keep the topsails at the mast-head, ready to throw all aback. This, however, must depend upon the strength of the wind, for care must be taken not to bring up too short, or the vessel will drag off, or hook her anchor under a rock and probably lose it.

Anchorage.

Man-of-war anchorage, so called by the pilots, is on the edge of the bank, which shows white, in from 9 to 6 fathoms water, with the President's flagstaff ($1\frac{1}{2}$ or 2 miles southward of the town) bearing SE. $\frac{1}{2}$ S., and the light-house N. by E. $\frac{3}{4}$ E. But should the vessel swing inshore, she will tail on to or near a rocky patch, with not more than 17 feet water on it. Vessels must therefore be prepared to weigh or slip the moment the wind threatens a change, but between the months of April and August it never shifts from the eastward without ample warning. Those merely wishing to communicate should remain under sail.

Riding place, a little southward of Government house, also affords better anchorage than that off the town, and there is less surf for landing.

An iron circular light-house, painted white, and 60 feet high, stands 400 yards SW. $\frac{3}{4}$ W. from the north point of Grand Turk island, and exhibits, 108 feet above the sea, a white *flash* light every *half-minute*, which may be seen 15 miles. Near the light-house is a lofty signal post.

Light.

The anchorage under the S. side of the island is called Hawk's Nest, and in the event of a vessel being obliged to quit that off the town, she will find this a safe roadstead until the wind draws round again to the eastward. Bea-

Hawk's Nest anchorage.

cons* are placed on Penniston and East cays and Toney rock as guides for this anchorage, but a stranger would run considerable risk in making use of them without the assistance of a pilot, and vessels drawing over 17 feet should not attempt it at all.

A reef, which runs SW. $3\frac{1}{2}$ miles from the S. point of the island, protects the anchorage from W. and NW., and about half a mile from the point there is a small intricate opening in it, called the Small cut, for vessels of 10 feet draught; and a mile from the point there is a larger one, called the Great cut, in which the depth is 18 feet, with the beacons on Penniston cay and Toney rock in one, bearing SE.

For Hawk's Nest, the best channel is round the SW. end of the above southwest reef, as there will then be room to beat up. In this case should the wind be well to the northward a vessel may haul round the reef, with the beacon on East cay just touching the E. end of Cotton cay, and this mark will lead between it and Southwest bank, about half a mile to the SW., on which there are only 12 feet water close to the edge. Or she may pass to the southward of Southwest bank with Toney Rock beacon in one with the SW. end of Cotton cay.

In steering in on this line a depth of $4\frac{1}{2}$ fathoms will be obtained on the edge of soundings, and then 6 and 7 fathoms to within about half a mile of Cotton cay. To the northward of the latter cay there is as little as $3\frac{1}{2}$ fathoms right across, but to the eastward of this there are 4 and 5 fathoms to the anchorage above the Dunbar shoals. The whole space is, however, studded with numerous small rocky heads distinctly seen, and in beating up the eye must be the guide. The most convenient anchorage will be found between the Dunbar shoals and a small dry sand-bore on the southwest reef.

Salt cay.

Salt cay lies SSW. $5\frac{1}{2}$ miles from Grand Turk island, on the extreme western edge of the bank. It is almost triangular in form, the N. side trending $1\frac{3}{4}$ miles E. and W., the W. side $2\frac{1}{4}$ miles N. and S., and the E. side $3\frac{1}{4}$ miles NE. and SW. The NW. end forms a bold bluff, which rises abruptly from the sea to the height of 60 feet, and on the summit there is a small lookout house. The town stands

* These beacons were down in 1870.

on the W. side toward the NW. end of the cay, between the beach and a valuable salt-pond. There is anchorage before it of precisely the same character as that at Grand Turk, and the same precautions must be observed.

The space between Salt and Cotton cays is full of dangers, and should not be navigated except in a case of sheer necessity, when the eye must be the guide.

Sand cay, the southernmost of the group, lies S. by W. Sand cay.
6½ miles from Salt cay, and is 1½ miles long N. and S., about 2 cables broad, and about 40 feet high. It is, however, nearly divided at the centre by a small neck of low bushy land, so that at a distance, in an E. or W. direction, it has the appearance of being two islets. Three-quarters of a mile SSE. of the cay there are two small black rocks lying close together about 2 feet above the sea; they are steep-to, and have 5 and 6 fathoms water between them and the point, and 8 fathoms at three-quarters of a mile SE. of them. On the edge of the bank, with the centre of the cay bearing NE. by E., there are 2 patches with 3 fathoms of water on them.

Sand cay is clear on all sides but the north. Here a coral reef runs off in that direction nearly 2 miles, and the sea breaks heavily over it, except after very fine weather. There are several small black rocks from 10 to 16 feet high on the reef, the northernmost of which lies about half a mile from the north end. The edge of the bank runs almost on a straight line between the reef and the south end of Salt cay, and this space is quite clear, with regular soundings right across to the eastward of from 9 to 11 fathoms, white sand and fans.

From the eastward do not come upon the bank, which extends 4 miles eastward of both cays, until the south end of Salt cay bears WNW., for the ground to the northward of this line is very foul. Moderate depths extend 1½ miles westward from Sand cay, and anchorage will be found here in 6 fathoms water about a mile off, with the gap bearing ENE. A vessel can weigh with any wind, and run off the bank on a south course clear of all danger. There are still the remains of some remarkable solid masonry on the cay, similar to those which may be seen at cape Isabélica on the Santo Domingo shore.

The southern tongue of the bank on which Salt cay lies extends in a SW. by S. direction about 8 miles.

Endymion rock. On this spit is the Endymion rock, where the ship of that name was lost in 1790. This rock, which has only about 4 feet of water upon it, is composed of seven or eight rocky heads, upon several of which there are from 13 to 23 feet of water, with from 7 to 8 fathoms between them.

The shoalest spot breaks frequently with a fresh breeze, but in smooth weather, when no breakers can be seen, the Endymion rock becomes exceedingly dangerous, as over it the water is so dark that it cannot be seen at any distance.

The channel which separates the Endymion rock from Salt cay appears safe and deep. The shoalest point of the rock is about 200 yards from the western edge of the bank of soundings, and from the S. point of Salt cay it bears S. W. $\frac{1}{4}$ S. $5\frac{1}{2}$ miles. To avoid and pass to the westward of this danger, it is necessary to steer clear of the white sandy bottom till the little hill at the N. end of Salt cay bears N. E. $\frac{3}{4}$ E. By keeping the mound on this bearing, the anchorage previously mentioned may be reached. Although no other dangers seem to exist in this region, it will be prudent to keep outside of the sand-bank lying south of Salt cay. The soundings on this bank are regular, varying from 7 to 10 fathoms. A cast of 14 fathoms may be had $1\frac{1}{2}$ miles E. of Endymion rock and from 7 to 15 fathoms between this rock and the southern extremity of the bank, which extends from it about S. by W. to a distance of $2\frac{1}{2}$ miles.

Swimmer rock. Swimmer rock, situated at the southern end of the Caicos bank, bears from Endymion rock W. by S. distant 12 miles. These two dangers mark, to a certain degree, the east and west sides of the southern entrance to Turk's island passage. A ship wind-bound in this passage can, as before remarked, anchor to the westward of Sand cay and wait for a fair wind.

**Directions for
Turk's island
passage.**

Since the establishment of a light on the north point of Grand Turk island, this passage is much frequented by vessels bound to the southern ports of the West Indies, but the Mona passage is much safer.

If it is intended to use this passage, it will be well, especially if at all doubtful of the ship's position, to reach the parallel of $21^{\circ} 40'$ N., (9 miles northward of the latitude of the light,) 60 miles to the eastward of it.

Having arrived at this position, and no land being in sight, the ship is sure to be to the eastward of the island and should then be kept west to pass 8 or 9 miles to the northward of the light. Being visible from deck at a distance of 15 miles, it will almost certainly be seen. Every opportunity must be used by night or day to verify the latitude. This is the more necessary, as frequently to the northward of these passages the current runs strongly to the N., and if the vessel should pass the light without its having been seen a serious disaster might occur. After making the Grand Turk light every precaution must be taken in rounding the north point of the island.

From a position 3 miles W. of the light-house, a SSW. $\frac{1}{4}$ W. course for 26 miles will carry the navigator 4 miles to the westward of Endymion rock and 8 miles E. of the Swimmer rock.

The current in Turk's island passage is generally very feeble and the tides are not felt.*

In this region, during the winter-months, if the wind hauls from SE. to S. it is an almost certain indication of a sudden change to the NW. Under these circumstances, it would be better to remain under short sail to the northward of the islets, keeping the light in sight till the change of wind has taken place.

If, after having entered the passage, the wind dies away and hauls to the southward, it will be advisable, instead of trying to beat to the southward, to anchor in some one of the places which have been pointed out to the westward of the cays.

If, before recognizing the entrance to Turk's island passage, the navigator has passed to leeward of it and the Caicos are in sight, care must be taken to pass them well to the northward at a distance of at least 8 or 9 miles. It is

* Commander H. D. Grant, R. N., in July, 1864, says: "Passed about 2 miles to windward of the Swimmer rock, and heading NE. by N. and NE. $\frac{1}{4}$ N. could not fetch the Grand Turk island, proving clearly the existence of a strong current. Joseph Lightbourn, an experienced pilot, informed me that it ran very strong, but always directly through the channel NE. or SW. The tides on the banks seemed pretty regular during our stay at these islands; they are very strong, sometimes as much as 3 knots."

dangerous, especially with light winds, to pass nearer to them, for the tides which run in the channels between the islands of the group are very strong and make themselves felt at a distance of 5 or 6 miles.

Fawn shoal.

Information in regard to a supposed shoal was given in the British Admiralty Notices to Mariners, No. 64, of July 9, 1868, as follows :

"A shoal with 8 fathoms of water has been discovered by Commander C. A. J. Heysham, H. M. S. *Fawn*, and named Fawn shoal, to the southward of Turk's island passage. The position of this shoal is said to be latitude $20^{\circ} 50' 54''$ N., longitude $71^{\circ} 29' 30''$ W. The shoalest water found was 8 fathoms. The extent has not been examined."

This shoal was unsuccessfully searched for by Commander R. L. Phythian, U. S. S. *Nipsic*, in April, 1873. He reports :

"Eight days were also spent in searching for this shoal. The hand-lead was kept going day and night, getting up-and-down casts of from 14 to 17 fathoms ; and, occasionally, casts with the deep-sea lead, with 100 fathoms of line out, were taken without obtaining soundings. The position of the ship was accurately determined by observations day and night.

"A careful observation of the currents indicated that daily tides were felt setting to the northward and eastward and southward and westward ; that they were irregular in strength and direction, and that the combined effect gave, in 24 hours, a current of from 4 to 20 miles, setting from S. 25° W. to S. 87° W."

Commander Phythian infers that Fawn shoal does not exist as reported. The currents that he experienced would seem to justify the supposition that the *Fawn* passed over the tail of Caicos bank at the southwestern entrance of Turk's island passage, which might have happened even with careful navigation.

Caicos bank
and islets.

The Caicos group consists of a number of small islands and cays, rising from a large, shallow sand-bank extending about 58 miles in a N. and S. direction, about the same from E. to W., and having a very irregular outline.

It is extremely dangerous on every side, particularly so on the southern part. Nowhere in this portion of it can a sheltered anchorage for a large vessel be found. The north-

ern and a large part of the eastern edge is formed by a chain of narrow wooded islands, very thinly inhabited. They produce a small quantity of fruit and vegetables for the markets of Nassau and Turk's islands. Most of the inhabitants are fishermen and wreckers.

The six principal islands of this group are West or Little Caicos, Providenciales, North Caicos, Grand Caicos, East Caicos, and South Caicos. These islands form a semicircle, extending from west to east and rounding toward the north. A large sand-bank extends from them in a southerly direction, having upon it a depth of water varying irregularly from 3 to 30 fathoms.

In the northern part of the group the sand-banks and reefs extend to a distance of 2 or 3 miles from the cays. From cape Comete, the NE. point of the East Caicos, a sand-bank extends to the eastward nearly 7 miles, then trending to the southward and westward it reaches the shore off Good's hill, about 4 miles to the southward of cape Comete.

On the northern edge of this bank is a dangerous patch of coral, called Philips reef, about 1 mile long, and on which the sea always breaks heavily. Its east end bears E. by N. nearly 4 miles from cape Comete and NW. $\frac{1}{2}$ W. 19 miles from Grand Turk island light-house. The soundings do not extend more than $\frac{1}{2}$ a mile to the northward of Philips reef; to the eastward they run off 2 miles, varying from 10 to 20 fathoms, and to the southward from 7 to 10 fathoms. A ship, therefore, approaching from either direction, should pay great attention to the soundings.

Philips reef.

In a case of emergency, a vessel might take the channel between cape Comete and Philips reef, where a depth of from 6 to 7 fathoms may be carried.

From cape Comete the north shore of East Caicos island forms a deep bight, and trends westward for about 8 miles to its west end, which is separated from Grand Caicos island by a narrow passage only fit for boats.

East Caicos isl.
and.

From this passage the shore of Grand Caicos runs to the NW. about 8 miles to Haulover point, the northern extremity of the island. Near this point is a large square house and a small settlement on the side of the hill. All along

Grand Caicos
island.

this shore the reefs extend at a distance of from 1 to 2 miles from the beach, having shelter inside them for boats.

To the northward of Haulover point the reef extends about 2 miles in an easterly direction, and between it and the shore a temporary anchorage may be found for small vessels. This anchorage is open to the eastward, and a heavy swell is generally felt there, but a strong current always sets to the eastward, which will enable a hardy vessel to beat out in moderate weather.

From Haulover point the shore trends to the westward about 10 miles to Juniper hole, the opening between the islands of Grand and North Caicos. There is here, between two bluff points, a shelter for boats.

North Caicos
island.

The north coast of North Caicos island is skirted by a reef at about $\frac{1}{2}$ a mile from the shore. The NE. point of the island is prolonged for about 2 miles by a dangerous rocky ledge. Outside of this ledge and the reef there is a bank of soundings about 1 mile wide, with a depth of from 10 to 12 fathoms.

This part of the coast may be easily recognized, as it rises into a chain of small hills about 100 feet high and having on the three easternmost the ruins of some large houses.

Mary cays.

Inside the reef and near the west point of the North Caicos are three small islets called the Mary cays. The coast takes from here a SW. direction for about 15 miles, forming a dangerous bight, skirted by a reef which extends more than $\frac{1}{2}$ a mile from the shore.

Fort cay.

Between the North Caicos and Providenciales there is a continuous chain of small islets, and on one of them, called Fort Cay, a low sandy islet covered with bushes and situated about 7 miles SW. from the Mary cays, there are some wells of poor water. There are also the ruins of a fort and a magazine. The reefs which skirt this cay to the westward form a small but well-sheltered harbor, having a depth of from 15 to 18 feet.

Providenciales.

On the NW. point of Providenciales is a peaked hill, on which there is a beacon formed of a pile of stones. From this peak the ground falls to the NNW. and terminates in a low sharp point, from which a dangerous reef extends for a mile to the eastward, having outside of it a bank of soundings.

To the westward of this point there is a bank of soundings about half a mile wide, called Malcolm road, on which a vessel may anchor in from 6 to 7 fathoms. This anchorage is dangerous and should only be made use of in a case of emergency and with the greatest caution.

Malcolm road.

The W. coast of Providenciales runs to the southward, forming two bays, each about 4 miles wide. Its southern point terminates in a rocky bluff which bears about ENE. from the N. point of the West Caicos, at about 5 miles distant.

From the southern limit of Malcolm road a dangerous ledge, called West reef, extends in a southwesterly direction about 7 miles, having a low uncovered sand-bank at its extreme end, which bears N., distant 3 miles from the NW. point of the West Caicos. From this last-mentioned point a reef extends northerly toward West reef, leaving between them a deep channel $\frac{1}{2}$ a mile wide. This channel extends for 3 miles to the eastward, with a depth of from $5\frac{1}{2}$ to 6 fathoms.

West reef.

Anchorage may be found here in 6 fathoms of water, and sheltered from all winds except those from NNW. This anchorage, however, is inferior to that at the S. end of the West Caicos.

Anchorage.

Vessels from the northward are apt to mistake the Providenciales for the West reef, and, by hauling too soon to the southward, run upon the West reef. With proper attention to the latitude, which should be checked on every possible occasion, this mistake need not occur.

West Caicos island, which is 6 miles long in a NNE. and SSW. direction, and about a mile and a half wide, has a uniform height of about 50 feet, with the exception of a hillock about 60 feet high at the SE. point, and another near the N. point about the same height. The western shore of West Caicos is bold, the soundings only reaching 200 yards from the shore, and in many places a less distance.

West Caicos.

The island is uninhabited and has no fresh water.

There is good anchorage under the southern shore of West Caicos in 5 or 6 fathoms of water, with a sandy bottom. It is sheltered from all but westerly winds, and is large enough for a vessel to get under way with any wind.

Anchorage.

The best berth is in 5 fathoms, with the hill on the SE. point bearing N. by W.

Eastern edge of
Caicos bank.

From cape Comete the eastern edge of the bank takes a southerly direction for 13 miles, when it turns abruptly to the westward, following the S. coast of the South Caicos island a distance of 2 miles. To the SW. of the last-mentioned island is Long cay, having an extent of 3 miles from SW. to NE. It is very narrow, and its eastern point forms a white bluff about 60 feet high.

Long cay.

Cockburn har-
bor.

Between this point and the south point of South Caicos is an opening half a mile wide, called Cockburn harbor, the entrance to which bears W. $\frac{1}{2}$ S. 22 miles from Grand Turk light-house.

The anchorage in Cockburn harbor is about half a mile wide, having a depth of 20 feet, shoaling to 12 feet at its upper end. It is entirely exposed to winds from SE.

Cove cay.

In the entrance is a rocky islet called Cove cay. The channel is to the westward of it.

A pilot (procureable at Grand Turk island) is necessary to enter the harbor.

The best berth is with the west point of Cove cay bearing E. by S. $\frac{1}{2}$ S. about 300 yards distant.

If desirable a ship may anchor outside the harbor, with the flag-staff on Government hill bearing north and the east end of Long cay W. by N. $\frac{1}{2}$ N.

Abreast of Cockburn harbor the bank of soundings only extends about 400 yards off shore, and should be cautiously approached.

Long cay an-
chorage.

From the S. end of Long cay a reef extends a short distance. Between the west side of the cay and a cay about a mile to the westward of it is a small but sheltered anchorage. A good berth is with the south point of Long cay bearing ESE. To the westward are Six Hill cay and Middleton cays.

Ambergris cay.

Eight miles from Long cay, and bearing S. by W. $\frac{3}{4}$ W. from it, is Ambergris cay, three miles long from north to south, and $\frac{2}{3}$ of a mile broad. In the middle of this cay is a hill about 100 feet high. The outer edge of the bank of soundings is about $2\frac{1}{2}$ miles from its east side. About $2\frac{1}{2}$ miles north of Ambergris cay are the Fish cays.

Fish cays.

Little Ambergris cay, lying a short distance west of Ambergris cay, is about 4 miles long from east to west, is very narrow, and is so low as to be with difficulty distinguished from seaward. Little Ambergris cay.

The Swimmer rock is a dangerous rocky ledge, about $\frac{1}{2}$ a mile in extent, and having less than two fathoms upon it. The white bluffs on Ambergris cay bear from it NNW. 13 miles distant and on a clear day may be seen from it. The rock is bold on the eastern side, but the SE. point of the Caicos bank terminates about 2 miles S. by E. of it, and on this part of the bank there are from 8 to 10 fathoms of water. Swimmer rock.

The edge of the bank on the eastern and southern sides is covered with dark-colored sea-weed, and is difficult to distinguish.

Upon the bank to the NW. of the Swimmer rock there is a string of little islets known as the Seal cays. Commencing a short distance south of Ambergris cay, they extend about 13 miles in the form of an arc toward the SW. Among them are Bush, Pear, Shot, and White cays. They are very low, and may not be seen from the outer edge of the bank of soundings. Seal cays.

From the SE. point to the S. point of the bank the edge runs to the WNW. about 8 miles, and then trends round to the SW., forming a deep bight in which is situated the dangerous rocky patch called the Whale breaker. Whale breaker.

This danger is about 5 miles W. of the Swimmer rock on the edge of the bank, and receives its name from its spouting up the water to a considerable height in heavy weather.

There are along the southern edge of the bank several other dangerous rocks, on one of which, called the South rock, close to the south point of the bank, there are only 10 feet of water. This danger bears S. by W. 8 miles from Shot cay, one of the Seal cays. South rock.

From the south point of the Caicos bank the edge runs in a NW. direction for 20 miles, then inclining more to the westward for 8 miles to the West sand-spit.

This spit is 2 miles long, north and south, lies nearly awash, and its north end dries at low water, bearing SE. by E. 24 miles from the S. end of West Caicos.

For 17 miles from the south point of the bank the edge is quite clear, but thence to the West Caicos it is very dangerous. All this part of the bank is of a light-green color, presenting a strong contrast to the deep blue of the sea outside. Captain Richard Owen, R. N., remarks that on this edge of the bank the luminous reflection, known as the bank blink, (previously referred to on page 30) may frequently be seen on the horizon and upon the edges of the clouds.

To the northward of the West sand-spit the edge of the Caicos bank is clear for about 5 miles. From here the coasters and wreckers leave the bank, crossing from the eastward and passing to the southward of Long cay.

French cay.

From here the edge runs WNW. 4 miles to French cay, small, low, and covered with bushes. It is the resort of great numbers of sea-birds, whose eggs are gathered by the fishermen from April to July.

A vessel may anchor to leeward of this cay on the edge of the bank in 6 fathoms. From here to the West Caicos the bank is rocky, steep-to, and dangerous.

Great Inagua island.

Great Inagua is an irregularly-shaped island about 45 miles long from NE. to SW., and about 18 miles across its greatest breadth from north to south near the centre. East hill, 132 feet high, and the loftiest on the island, is about 9 miles northward of the northeast point. There are several other small elevations on the south side, generally about 30 feet high, appearing from the southward like separate islands. Salt-pond hill, the highest of them, is in the evening sometimes taken for the SW. point of the island when coming from the southward. Several wrecks have from this cause taken place. The island cannot generally be seen from a distance on account of fogs and mist which frequently hide it.

The western coast of Great Inagua is mostly composed of low bluffs, and is generally clear, with, however, a few rocky dangers at from 200 to 400 yards from shore.

Mathew town road.

Mathew town road lies 3 miles north of the SW. point of the island abreast of the small settlement from which the anchorage takes its name. The village is scattered along the shore, with large salt-ponds behind it. On a small rocky point near the northern end of the village is Henrietta fort,

and $\frac{1}{2}$ a mile further north is Mortimer hill, about 40 feet high.

With the usual trade-wind the only safe anchorage is off the village in $4\frac{1}{2}$ and 5 fathoms water about 600 yards off shore, and near the edge of the bank of soundings.

For a man-of-war the best anchorage is with fort Henrietta bearing east by north.

Stand in slowly and be ready to anchor as soon as white water is reached, which may be recognized from aloft. If the weather threatens a change the vessel must leave at once and run round to Molasses road, east of the SW. point of the island, as soon as the wind is to the northward of West. Before such changes of weather the barometer usually falls to about 29.80.

Vessels coming here for salt may anchor off Salt pond canal, a mile and a half south of the town, but the swell coming round the SW. point of the island makes it a rough anchorage.

Water can only be procured from a well in Man-of-war bay, 8 miles north of the town, unless, which seldom happens, the inhabitants can spare any from their tanks. Water.

It is high water, full and change, at Mathew town at 8^h 0^m. Spring-tides rise $3\frac{1}{2}$ feet, neaps 2 feet. Along the west coast the flood runs to the southward at the rate of about $\frac{1}{2}$ a knot, and meets the flood from the eastward off the SW. point. Tides.

A stone tower of whitish color, 114 feet high, and slightly conical, exhibits a white revolving light. It stands at the sea margin about 1 mile southward of Mathew town and 2 miles NW. from SW. point. Light.

The light attains its greatest brilliancy every minute, is about 120 feet above high water, and should be seen from a distance of 17 miles.

Vessels approaching the light must pay careful attention to its bearing, as it can be seen over the land where not intercepted by objects.

Between Middle point and Northwest point is a bight about 6 miles wide called Man-of-war bay. The anchorage extends about $\frac{1}{3}$ of a mile from shore all around the bay, except the S. shore, and is sheltered from all but westerly winds. Man-of-war bay.

With northerly winds, the best berth is in the northern part of the bay with the outer point bearing WNW.; with southerly winds, off the sandy beach in the SE. part of the bay.

The same precautions must be observed as in anchoring in Mathew Town road, and care taken to pick out a clear sandy spot.

Alfred sound.

The NW. point of Great Inagua is low, the tops of the palmetto-trees on it being only about 20 feet above the sea. Thence the shore bends round to the eastward for $2\frac{3}{4}$ miles to Saline point, forming a sandy bay. A reef nearly dry at low water, and steep-to, skirts this bay at the distance of about $1\frac{1}{2}$ miles from the shore, and within it there is a snug anchorage for a small craft drawing 6 feet, over white coral sand and patches distinctly seen, called Alfred sound. The entrance lies between Northwest point and the west end of the reef; there is also a narrow intricate cut through the barrier, NE. about $1\frac{1}{4}$ miles from the point. With the wind to the southward of E. a vessel of 12 feet draught may anchor in the opening to the westward, named Alfred road, taking care not to bring Northwest point westward of SSW.; but it is by no means a desirable anchorage.

The flood stream in Alfred sound sets eastward, the ebb westward, at the rate of about a knot.

From Saline point, which is low and rocky, the northern shore of Great Inagua takes a NE. direction 7 miles to Palmetto point. The reef which protects Alfred sound comes gradually home to this point, and E. by N. $\frac{1}{4}$ N. about 5 miles from Northwest point there is on the edge a small cay about half a mile long. At three-quarters of a mile eastward of the cay, and N. $\frac{1}{4}$ W. from a black isolated rock on the beach, there is a small cut through the reef, in which there are 8 or 9 feet water; the reef runs quite straight and is steep-to. Carmichael point bears NE. by E. $\frac{1}{2}$ E. distant nearly 7 miles from Palmetto point, and the coast between forms a bay about $1\frac{1}{2}$ miles deep, with a bold rocky shore all round steep-to. Midway there is a small conical mound called James hill, about 90 feet high, which is remarkable as being the only elevated ground on the N. side of the island westward of Carmichael point.

From Carmichael point to the NE. point of the island, which bears E. by N. $\frac{1}{2}$ N. 23 miles, the shore falls back to the southward and forms an extensive bay named Ocean bight, which is $8\frac{1}{2}$ miles deep. On the E. side soundings run off about a quarter of a mile from the beach, but the head and the western shore of the bight are steep-to, and present a bold rocky coast, against which the sea breaks with great violence, particularly during northerly winds. At the head of the bight there are a few hills from 70 to 90 feet high.

The eastern side of the island is skirted by a reef the whole way, from 200 yards to half a mile from the beach, with soundings outside it to the distance of about half a mile. Toward the NE. point there are some sand hills rather higher than the rest of the coast, off which the reef extends nearly a mile, falling into the NE. point in a curve.

From the SE. point of Great Inagua a spit or tongue of the bank, from 5 to 2 miles in breadth, runs off E. $\frac{1}{4}$ E. for a distance of 6 miles, and on it is a rocky patch, on which H. M. S. *Statira* was wrecked in 1815. It is about half a mile long, with as little as 6 feet water on it, breaks in heavy weather, and lies S. 3 miles from the SE. point, SE. $1\frac{1}{4}$ miles from the Sail rock—a small black islet 20 or 30 feet high, bearing SSW. $1\frac{1}{2}$ miles from the point—and E. $\frac{3}{4}$ S. $9\frac{1}{2}$ miles from Lantern head, a remarkable prominent bluff 82 feet high.

Statira shoal.

The position of this shoal is only $\frac{1}{3}$ of a mile from the eastern edge of the bank, but the soundings are from 6 to 8 fathoms for $2\frac{1}{2}$ miles to the southward, and the same depth for $1\frac{1}{2}$ miles to the westward of it, so that the lead will give sufficient warning from these quarters, but not from the eastward. There are 6 fathoms between it and the Sail rock, and about 5 fathoms between the latter and the main. The water on the bank being of a dark color, it is difficult to distinguish the shoal, except in heavy weather, when the sea always breaks.

From the SE. point the southern shore of Great Inagua trends W. a little southerly about 28 miles to the SW. point. On either side of Lantern head the land bends inward, forming bays. The shore is skirted by a reef to the distance of about 2 miles, which terminates about 5 miles to the west-

ward of the Head; but the shore is still foul to the distance of about 1 mile all the way to the SW. point. To the eastward of the Head, S. by E. $\frac{1}{2}$ E. from Lagoon hill, there is an opening through the reef capable of admitting small coasters to a snug anchorage within. The interior, however, is so completely studded with small coral heads, that the eye alone must be depended upon as a guide. The bay on the W. side of the Head is only safe with the prevailing trade-wind, which is here more regular than at the islands to the NW. From abreast Salt Pond hill, at about 4 miles eastward of the SW. point of the island, the land bends to the northwestward and round to the SSW., forming a bay, and is very low and foul.

Molasses reef.

Two miles E. $\frac{1}{4}$ N. from the SW. point of Great Inagua, and SW. by S. from Salt Pond hill, there is a rocky ledge about half a mile in extent, E. and W., called Molasses reef, which is steep-to, and on which the sea breaks with easterly winds. There is a clear spot eastward of the reef named Molasses road, where vessels driven from the anchorage on the west side of the island may ride out NW. and N. winds in safety. The ground, however, is flat and rocky, and they must weigh the moment the wind draws round to the usual quarter. The best berth will be in 8 or 9 fathoms, just within the edge of soundings, and about a mile eastward of the reef, with Salt Pond hill N. by E., and the SW. point just open to the southward of the reef W. $\frac{1}{4}$ S. Great care, however, must be taken in approaching, for with the wind off shore the reef does not show itself, and the discolored water is not easily seen at even a short distance; care must also be taken not to shoot too far in, and be prepared to anchor the moment soundings are struck.

Anchorage.

Clarion shoal.

The Clarion shoal, marked "doubtful" on the charts, has been given an approximate position of 16 miles SW. $\frac{3}{4}$ S. from Mathew Town light-house.

Commander Phythian, U. S. S. *Nipsic*, reports in May, 1873:

"A search of five days was made for the Clarion shoal. The French ship *Caennais*, mentioned in U. S. Hydrographic Notice No. 35 of 1871 (there erroneously called a Spanish vessel), was lost on the night of the 30th of November, 1869, on Molasses reef, a short distance to the eastward of the SW. point of Great Inagua island. The land be-

ing low, it could not have been seen from the *Caennais* when she struck, and the master, thinking himself on Clarion shoal, took to his boat, and, having a fair wind, ran for the coast of Cuba. Reaching Havana, he reported his vessel as lost on Clarion shoal. This information was gained from the French consular agent at Mathew town, who sold the wreck. No doubt can exist as to the identity of the vessel, for the date of the wreck given in the notice agrees with that upon the French consular records.

"The only other vessel supposed to have run upon this shoal is the steamer *Clarion*, and she struck on a dark night, as long ago as 1842. She afterward got off without having seen land, and proceeded on her voyage.

"From information gained at Mathew town, it is certain that this shoal does not exist. Since the establishment of the light at that port an average of not less than three vessels a day pass near the reported position of Clarion shoal, yet none have seen any signs of discolored water."

This shoal is mentioned in a note to page 425, West India Pilot, vol. ii; also page 473, Blunt's Coast Pilot, 21st edition.

Little Inagua island is somewhat quadrangular in form, 8 miles in length E. and W., and about 5 miles in breadth. In the centre of the NW. side there is a flat hill about 60 feet high, which is the only rising ground on the northern part of the island, and on the S. side there are several hills of about the same height. The SW. point bears NNW. $\frac{1}{4}$ W. 5 miles from the NE. point of Great Inagua, and the SW. end of West Caicos is distant 25 miles from the E. end of the island. A dangerous reef, steep-to, runs off three-quarters of a mile from the E. end, and there are generally heavy breakers on it.

The NE. and NW. sides of the island—each about 5 miles long—present a bold rocky shore, with soundings on a clear bottom to the distance of about one-third of a mile. The SW. side appears also to be free of danger. The SE. side is about 8 miles long, and eastward of the south point there is a small bay, and in front of it snug anchorage for small craft, protected by the reef, which terminates near the middle of this shore. The entrance to this anchorage is through a break in the reef about $2\frac{1}{2}$ miles eastward of

the point. There are no inhabitants, but there is said to be wild hogs on the island, and consequently water.

Hogsty reef.

Hogsty reef, or Los Corrales, is in shape like a horse-shoe, convex to the E., $4\frac{1}{2}$ miles in length E. and W., and $2\frac{1}{2}$ miles in breadth. The centre of the W. end bears N. by W. $\frac{1}{2}$ W. 35 miles from Northwest point to Great Inagua, and about SE. $\frac{1}{4}$ E. nearly 38 miles from the W. end of Castle island. The reef forms a good harbor, with a depth of from $3\frac{1}{2}$ to 5 fathoms; there are a few black rocky patches on the clear white sand, but they may be easily seen and avoided.

At both ends of the Horseshoe there is a small low sandy cay, nearly devoid of vegetation. A stone beacon, 62 feet high, 8 feet in diameter at base and 3 feet at top, stands on Northwest cay; there is also a tank for rain-water. The reef extends about a mile to the WNW. from the southern cay, and the passage in lies between it and Northwest cay. There is good anchorage just inside the edge of soundings, in 6 fathoms, to the southward of Northwest cay; but there is plenty of room to work up the Horseshoe, if necessary.

Vessels bound through the Crooked Island passage, and being so far to windward, are recommended by some navigators to use the anchorage at the Hogsty reef for the night, in preference to that under Great Inagua; it will, however, be far more prudent to avoid so dangerous a bank altogether. The course from the anchorage off Mathew town to Castle island is NNW. $\frac{1}{4}$ W. distant about 80 miles, which will lead about 10 or 11 miles westward of the reef. It is seldom that any weather-current will be found here, and the run should be regulated so as to make Castle island soon after daylight, to enable the vessel to get through the passage before dark.

Cuidado reef.

Cuidado reef was in vain sought for in 1832 by Capt. Richard Owen, R. N., and in 1873 by Commander Phythian, U. S. N. The wreckers who are continually passing over this region state that they have never seen discolored water. The navigator should therefore exercise the greatest care in passing in the vicinity of this and other dangers, the positions of which are still doubtful.

This shoal is said to be about 3 miles in length north and south. It is said to bear from the E. point of Little Inagua N. $\frac{1}{2}$ E. 24 miles; from the S. point of West Caicos NW. $\frac{3}{4}$

W. 30 miles, and from the SW. point of Mariguana SSE. $\frac{1}{2}$ E. 27 miles.

The following is an extract from the remarks of Commander R. L. Phythian, U. S. N., in May, 1873:

"A search was made for the Cuidado reef for four days. The weather was good, the sea smooth, and wind light. The ship was allowed to drift at night, 30 fathoms of chain with a light anchor attached being payed out. The hand-lead was going constantly and a careful lookout kept from aloft. Frequent casts of the deep-sea lead were also taken, with 100 fathoms of line out, without obtaining soundings.

"On the 24th of April saw on the horizon what had every appearance of a reef. Ran for it, lowered a boat, and found it to be a large field of sea-weed. Again, on the afternoon of the same day, saw what was supposed by all on deck to be a reef, but which, upon examination, proved to be the effect of mirage. This illusion was observed several times on subsequent days, and was in each case regarded by all who saw it the most perfect that they had ever witnessed."

This reef is mentioned in notes to page 425 in West India Pilot, vol. ii, and page 473 of Blunt's Coast Pilot, 21st edition.

Mariguana island is 25 miles in length in an E. and W. direction, and from 2 to 6 miles in breadth, generally low, about 30 feet above the sea, and thickly wooded. Near the centre of the island there is a hill 110 feet, and toward the E. end there are several small hummocks from 40 to 60 feet high. Abraham hill, at the back of Start point, is about 80 feet, and a long flat ridge behind the SE. point 90 feet high. There is no good water to be found on the island; wood is in abundance. In 1857 there were 20 settlers located in Betsy bay, at the W. end of the island.

The north side of Mariguana trends about WNW., and is indented with a few small exposed bays and skirted by a reef along its whole length, which terminates about $1\frac{1}{2}$ miles northward of the NW. point; at $1\frac{1}{4}$ miles NE. by E. of this point, on the edge of the reef, there is a cluster of high rocks. Under the lee of the spit there is good shelter for small craft, by passing in close round the NW. point by the eye.

The W. side of Mariguana runs nearly straight SSW. $6\frac{1}{2}$ miles, and is so bold that soundings do not reach more than a cable from the shore.

From the SW. point the southern coast of Mariguana takes an easterly direction for about 4 miles and then bends round to the SE. to Start point, S. of Abraham hill. To the NW. of the point soundings extend out for half a mile, with a clear sandy bottom. To the eastward of Start point the shore trends to the NE. and E., forming a deep bight, called Abraham bay, which terminates at a point 5 miles E. by N. $\frac{1}{4}$ N. of the Start. A dangerous reef sweeps round to the eastward between the points, at the distance of about 2 miles from the head of the bight and is steep-to. At about a mile eastward of the Start there is a small opening through which coasters may carry by the eye 2 fathoms into a good harbor within the reef. From the E. point of the bay the coast takes an ENE. direction for about $3\frac{1}{2}$ miles to the foot of the centre hill, at the narrowest part of the island, which is here 2 miles across, and then trends round to the SE. for nearly 9 miles to the SE. point. Of the latter portion soundings run out about a third of a mile.

East reef.

The E. end of Mariguana trends NE. and SW. $4\frac{1}{2}$ miles, and a dangerous reef commences at the SE. point and extends to the eastward about $8\frac{1}{2}$ miles and is 2 miles in breadth. At the SE. extreme of this reef are several dry rocks just above water, and at the NE. elbow there is a small low cay of rock and sand a few feet high. On the S. side of the reef, about 4 miles eastward of the SE. point of the island and nearly S. of a small cay which lies close off the NE. point, there is a little opening through which small craft find their way into snug anchorage under the above cay. The extreme E. end of the reef is 4 miles from this cay, which appears as part of the main-land, except on a NNE. and SSW. bearing. The reef is steep-to on the S. side, but soundings will be obtained within half a mile of the E. and N. sides.

Plana cays.

The Plana or Flat cays are two islets WNW. 22 miles from the west end of Mariguana island, and are separated by a narrow channel. The eastern cay, which is 5 miles long E. and W. and about a third of a mile broad, is skirted by a reef extending a third of a mile from the N. and S.

sides, and three-quarters of a mile from the E. end. The W. end of the cay forms a narrow point, is steep-to, and at about a mile from its extremity there is a hill 70 feet high, but the rest of the cay is low and flat. A bank of soundings, 3 miles broad, extends ESE. nearly $4\frac{1}{2}$ miles from the E. end, and the general depth on it is from 5 to 8 fathoms; but on the southern edge there are some dangerous shallow spots, and, the whole bank being a dark rocky bottom not easily distinguished, this end of the cay should be approached very cautiously.

The western cay is oval shaped, $2\frac{3}{4}$ miles long NNE. and SSW., and $1\frac{1}{8}$ miles wide. A reef extends $2\frac{1}{2}$ miles northward from the NW. end, and at the N. extreme it is nearly dry; it then turns to the SE. and joins a cluster of dry rocks about three-quarters of a mile northward of the NE. point of the cay. A bank of soundings extends off half a mile outside the reef to the NE. and a full mile to the eastward of the NE. point to within half a mile of the eastern cay. All the eastern side of the cay is fringed with a reef to the distance of about a quarter of a mile, terminating at the SW. sandy point.

On the W. side of the western Plana cay, near the SW. point, there is a clear bank of soundings extending about a third of a mile from the shore, on the edge of which anchorage will be found in about 7 fathoms water, with room enough to weigh, should the wind come unexpectedly from the westward. Anchorage.

At the back of the SW. point of the western Plana there are some wells of excellent water, a little behind the sand-ridge: the casks can be rolled up and rafted off very conveniently; indeed, it is the best place for watering among these islands, with the exception of Nassau. Water.

The Crooked island group of islets rises from a triangular shaped bank, 48 miles in length NE. and SW., 45 miles N. and S., and about 30 miles E. and W. The NE. point of Acklin island, the SW. point of Castle island, and the Bird rock form the angular points. Crooked islands.

Castle island is about 2 miles in length in an E. and W. direction, half a mile in breadth, and about 30 or 40 feet high. The SE. end forms a remarkable bold sand-cliff; the SW. end runs off to a low sandy point. The edge Castle island.

of soundings is not more than the third of a mile from the S. and W. sides of the island; but a bank, with 6 to 12 fathoms on it, extends off to the distance of 3 miles from the E. side, and then trends toward the South bluff of Acklin island. A chain of small dry rocks runs to the northward for about $1\frac{1}{2}$ miles, from the NE. end of the island, half-way to the S. end of Acklin island. The NE. rock is very remarkable, resembling an old castle—hence the name of the island; and between it and Acklin there is a passage for boats.

Light.

A fixed white light is shown from a slightly conical tower 114 feet high, built of whitish stone, with three red bands, and standing 270 yards within the SW. extreme of Castle island. The light is 123 feet above the level of high water, and should be seen from a distance of 17 miles in clear weather.

Fish cays.

From the southwest point of Castle island the edge of soundings runs almost directly for Salina point, on the west side of Acklin, about 3 miles from the south end of that island. Salina point is low and bushy, but the land rises gradually to the eastward to the height of 150 feet. To the southward of the point there is good temporary anchorage in Jamaica bay, with the prevailing winds, in 9 fathoms water, on the edge of the bank. From Salina point the coast trends eastward, but the western edge of the bank takes a northerly direction for 12 miles to the southernmost of the Fish cays, and then bends round to the NW. to the south end of Fortune island, which bears N. $\frac{1}{2}$ W. 27 miles from Castle island.

Abreast the Fish cays the edge of the bank is clear for about one-third of a mile inwards, but elsewhere it is foul and dangerous until close up under Fortune island, where there is a small clear space on which a vessel will find good shelter from northers, with the south point bearing NW. by N. distant three-quarters of a mile, and a small sand-bore which breaks E. $\frac{1}{2}$ S. Be careful not to shoot in too far, as the ground becomes foul a very short distance within the line of soundings.

Fortune island.

Fortune island, or Long cay, is 9 miles in extent NE. by N. and SW. by S., varying its breadth from $1\frac{1}{4}$ miles at the south end to barely a quarter of a mile at the north extreme. At about 2 miles from the south end a hill rises gradually

to the height of 110 feet, and is a good landmark coming either from the northward or southward. Near the centre of the island, on the west side, there is a small settlement containing about 350 inhabitants, and at the back of it a very productive salt-pond. The whole shore is steep-to; nevertheless, with the usual easterly winds, the few vessels that come here for the salt find a temporary anchorage off the pond, but so close in that there is not room to swing, and they must be prepared to quit the moment a change threatens.

Crooked island is separated from Fortune island by a small channel, through which wreckers, drawing under 7 feet water, find their way into shelter from NW. winds. There is anchorage on the edge of the bank full three-quarters of a mile off shore, but not to be recommended. From thence the western side of the island trends NNW. $\frac{1}{2}$ W. 9 miles; the shore is low, woody, generally foul, and soundings do not extend off more than 2 cables. At about 3 miles inland the Blue hills rise to the height of about 200 feet.

Crooked island.

A dangerous reef extends off in a NW. direction 2 miles from the northwest point of the island, it then bends round gradually to the E. and ESE., and skirts the northern shore at the distance of about a mile. A small cay, called Bird rock, about 10 feet high, lies NNW. about a mile from the northwest point, and close to the southward of it there is a narrow intricate opening in the reef, leading into a small well-sheltered basin within, named Portland harbor, in which there are $3\frac{1}{2}$ and 4 fathoms water; but it requires the assistance of a pilot. From a slightly conical stone tower on the centre of Bird rock, 112 feet high, a revolving white light is shown, which attains its greatest brilliancy every 90 seconds. The light is about 120 feet above high water, and in clear weather should be seen about 17 miles. Vessels approaching this light must pay careful attention to its bearing, as the point of the reef extends about $1\frac{1}{2}$ miles NNW. of the tower, and the current to the north of Crooked island is variable. From the northwest point of Crooked island the northern shore takes an ESE. and SE. direction 11 miles, and then trends to the eastward for about 8 miles, to its east end.

Bird rock.

Light.

At the bottom of the bight are the Major rocks, and about 4 miles to the eastward of them mount Pissah rises abruptly from the shore to the height of about 200 feet.

The only anchorage off Crooked island is at about $2\frac{1}{2}$ miles southward of the NW. point, nearly abreast a remarkable large house standing close to the shore, with a flag-staff near it. A short distance to the northward of it is Landrail point, which is low and rocky, and has also a small flag-staff near the extremity. The shore to the northward of this forms a low sandy beach. A convenient berth will be found with the flag-staff at the above house bearing SE. by E. $\frac{1}{4}$ E.; and the flag-staff on the point N. $\frac{3}{4}$ E., and in one with a house, called Marine farm, on the N. end of the island.

This anchorage must be approached with great care, under easy sail, and be prepared to come to the moment soundings are obtained, or to back off if necessary. The edge of the bank will be seen from aloft; the bottom is sand and grass, good holding-ground. In the winter season it must be left the moment the wind veers to the southward of E., but in the summer months a vessel may remain, as the wind is generally light from this quarter; it will, however, be more prudent to keep off under sail. A supply of stock and vegetables may generally be obtained here, but it will probably detain a vessel some hours.

During strong westerly winds the best landing-place is close northward of Landrail point, inside a reef running a little to the northward, and which affords shelter.

Water.

There are some wells of good water on the S. end of Crooked island, called the French wells; but as the anchorage here is full three-quarters of a mile from the shore, it is inconvenient for watering. There is also a convenient well of excellent water near Landrail point, and a good landing-place on the beach northward of it.

Tides.

It is high water, full and change, at Crooked island at 7^h, and the rise about $2\frac{1}{2}$ feet.

Acklin island.

Acklin island, the largest of the group, and containing some 400 inhabitants, is separated from Crooked island by an opening about $2\frac{1}{2}$ miles wide, but so shallow that it may be waded across at low water. The extreme length of the island from the NE. to the SW. points is 45 miles, and its breadth varies from about 1 to 7 miles. Its N. side is about

9 miles in length E. and W., and its NE. point bears E. by S. about 28 miles from Bird rock, at the NW. end of Crooked island. A bank of soundings extends E. and NE. 4 miles from the NE. point, having a general depth of from 5 to 12 fathoms on it; but E. by S. $\frac{3}{4}$ S. 4 miles from the point there is a dangerous rocky patch nearly awash about a quarter of a mile in extent, which generally breaks, and called the NE. breaker. It lies within a quarter of a mile of the edge of soundings, where the depth is 20 fathoms, and bears WNW. 11 miles from the NW. end of Plana cay reef.

From the NE. point the eastern shore trends about S. $\frac{1}{2}$ E., 12 miles, with a slight curve inwards, to Creek point, where the island is little more than a mile in breadth; the shore is foul to the distance of about half a mile; at about 2 miles from the former point there is a small reef-harbor for wreckers. From Creek point the shore takes a SW. direction for 35 miles, and is skirted by a reef to the distance of half to $1\frac{1}{2}$ miles.

About 9 miles to the SW. of Creek point the shore falls back to the westward and forms Abraham's bay, in front of which there is an opening in the reef leading into an exposed anchorage; but this side of the island is very dangerous, and had better be avoided altogether. At the distance of 6 miles ENE. from the S. end of the island there is a remarkable prominent bluff headland, named South bluff, with a range of hills at the back about 150 feet high. The western side of the island is irregularly shaped, and only accessible to boats, or very small coasters, from the shallow water on the bank.

The Mira-por-vos is a cluster of small, low, barren, rocky islets at the N. or thick end of a pear-shaped bank, 11 miles in length SSE. and NNW., and 6 miles in breadth at about $3\frac{1}{2}$ miles from its NW. extreme. The northern islet, named North rock, is about half a mile in length NE. and SW., very narrow, and from 15 to 20 feet high. It lies about half a mile within the edge of the bank, and the soundings around it at the distance of about 2 cables are from 5 to 9 fathoms.

The NE. rock lies SE. $\frac{1}{2}$ E., about 2 miles from the North rock, and is about the same dimensions. This islet is foul

to the NE. to the edge of the bank, a mile distant; to the NW. a ledge extends off $\frac{3}{4}$ of a mile, and between it and the North rock the depths are 5, 6, and 7 fathoms; to the SW. it is connected to the South cay by a reef nearly dry, on which there are several small dry rocks.

The South cay is the largest of the cluster, being $\frac{3}{4}$ of a mile in length NE. and SW., and nearly half a mile in breadth; close off its eastern side there is a remarkable square black rock. In the centre of the cay there is an uncultivated salt-pond; and on the south shore are two remarkable sand-hills about 30 feet high, which may be seen from the SE. point of the bank. In moderate weather, with the usual easterly winds, a vessel may anchor about $\frac{1}{2}$ a mile from the west end of this cay, in 8 or 9 fathoms, clear sandy bottom.

To the SE. of the above cays there are several detached coral ledges, on which there are only 3 fathoms water, and a heavy swell generally rolls over them, which renders them dangerous. The outermost lies near the NE. edge of the bank, SE. by E. 2 miles from the NE. rock, and W. by S. 7 miles from the W. end of Castle island. The outermost to the SE. lies SE. $4\frac{3}{4}$ miles from the sand-hills on South cay, close also to the eastern edge of the bank, and SW. $\frac{1}{2}$ W. 9 miles from Castle island. It is $2\frac{1}{2}$ miles within the SE. extreme of the bank and $1\frac{1}{2}$ miles from the SW. side. In these directions the soundings are from 7 to 10 fathoms, and these depths will be carried all along from $1\frac{1}{2}$ to 2 miles within the western edge of the bank up to South cay; the lead will therefore be of great use in approaching from these quarters, and a bearing of the cay will indicate when south-westward of the coral ledges.

Tides.

It is high-water, full and change, at the Mira-por-vos islets at 9^h 30^m, and the rise is about 3 feet. The current generally sets to the SW. over the bank a mile an hour.

Diana bank.

The Diana bank bears S. $\frac{3}{4}$ E. 18 miles from the S. end of Long island, and W. $\frac{3}{4}$ S. 20 miles from the S. end of Fortune island. This bank of sand and coral, 4 miles in extent E. and W. and 3 miles N. and S., has from 9 to 15 fathoms water on it, and 20 fathoms on its edge, and may be made a useful guide to vessels beating through Crooked island passage in the night.

The position of Brown's shoal as laid down on charts previous to 1874 was erroneous. In that year it was fixed by Commander A. V. Reed, U. S. N., as in latitude $21^{\circ} 29' 52''$ N., longitude $74^{\circ} 44' 6''$ W. The bank is of sand and coral, extending 2 miles E. and W. and 1 mile N. and S. It has from $9\frac{3}{4}$ to 17 fathoms of water on it and can only be seen under very favorable circumstances.

Brown's shoal.

Crooked Island passage is the best one for vessels bound to the northward or northeastward from the passage between Cuba and Santo Domingo. It is also constantly used by vessels bound from the United States to ports on the south side of Cuba, to Jamaica, and the isthmus of Panama.

Crooked island passage.

Since the establishment of the excellent lights on Bird rock, Castle island, and the Great Inagua, there is not the least difficulty. Before Bird rock light was established several vessels got ashore on Watling's island, being swept there by the current, which almost everywhere through these islands sets to the westward at the rate of from half a mile to a mile an hour.

This set is occasionally stronger or weaker, according to the varying force of the trade-wind. In the neighborhood of Conception isle it is said generally to run strong to the NW. Some observations tend to show that after northers, or on the increase of the moon, the current sets to the northeast, and on the decrease of the moon, as it approaches to change, there is a similar set to the southwest. There is, however, no certainty in the case, and consequently more than ordinary attention is required when navigating among the West India islands; the seaman, therefore, should not fail to take advantage of every opportunity of determining the ship's position at night by observations of stars, to the north and south for latitude and to the east and west for time. This mode of observing would generally compensate for a dull or indistinct horizon, and with practice would certainly give results not far from the truth.

Should a sailing-vessel be caught in the Crooked Island passage by a northwester, instead of beating about, which would be attended with considerable risk, it will be better to seek shelter, when the wind has drawn round that far, under the south end of Fortune island, or run out and keep under the lee of Acklin island, under easy sail, until the

wind draws round to the NE., which it will do in two or three days at the farthest.

Samana cay.

Samana or Atwood's cay is uninhabited, and lies out of the usual tracks of vessels. It is about 9 miles long from east to west and from 1 to 2 miles in width. Its surface is hilly and broken, and about one-third from the west end rises to the height of 100 feet.

The north side of the cay runs nearly straight and is skirted by a reef to the distance of about one-third of a mile. On the north side, at about $1\frac{1}{2}$ miles from the west end, are three dry rocks close to the edge of the reef. The west point is low and sandy, and from it a narrow reef, nearly dry and steep-to, extends westward.

This very dangerous reef is said to extend from 4 to 5 miles from the west end of the island, the extreme point lying 2 miles farther out than is represented on the charts.

From the west end of the cay the southern shore trends ESE. 3 miles, when it falls back to the northward and forms two small bays. A dry reef sweeps out to the southward in front of the bays, and within it at the eastern end are two small cays. There is here also a remarkable white cliff, and the shore from thence trends ENE. 4 miles to the east point of the island. At about half a mile from the east point is a cay a mile in length east and west and 75 feet high, and 2 miles eastward of it another, but much smaller and lower. The reef which skirts the southern cays continues in an unbroken line for more than a mile eastward of the latter islet, terminating in a detached breaker at the eastern extreme.

Water.

There is anchorage in 8 fathoms water on the southwest side of Samana cay, about 2 miles from the west point, and 3 cables off shore, but the ground is not good.

Good water may be obtained by digging wells.

San Salvador or
Watling's island.

San Salvador or Watling's island, the established land-fall of Columbus at daylight on the 12th October, 1492, is about 12 miles in length north and south, from 5 to 7 miles in breadth, and its shores are slightly indented. The interior is largely cut up by salt-water lagoons, separated from each other by small woody hills from 100 to 140 feet high; it is, however, considered to be the most fertile of the group, and raises the best breed of sheep in the Bahamas. The inhabitants, about 500 in number, are scattered about

the island, in consequence of there being no safe anchorage except at the north end, where there is a reef-harbor for coasters.

A bank, with from 6 to 15 fathoms water on it, over a dark bottom, extends $2\frac{1}{2}$ miles in a SE. direction from the SE. point of the island, and on the inner part of it, at about half a mile from this point, are some small but remarkably high, black, rocky islets, named the Hinchinbroke rocks.

The eastern shore of the island is fringed with a reef, to the distance of about $\frac{1}{3}$ of a mile, which sweeps round the N. of the island at 3 miles from that shore. On the eastern shore, soundings extend outside the reef to the distance of a mile, and $1\frac{1}{2}$ miles from the N. end of the spit.

There are several small cays on and within the reef off the N. side of the island. White cay, so called from its appearance, is the northernmost, and lies about $\frac{3}{4}$ of a mile from the NW. extreme of the reef. At about a mile N. of the NW. point of the island is Green cay, and round the S. end of it is the channel, with 7 feet water leading into the anchorage for coasters.

Green cay.

Soundings do not reach more than half a mile from the W. side of San Salvador island, in many parts much less, and the edge is generally very foul. The SW. end terminates in a long, low, sandy point, steep-to, which bears N. by W. 66 miles from Bird rock, and NE. $\frac{1}{2}$ N. $18\frac{1}{2}$ miles from the NE. end of Rum cay. At about 2 miles eastward of the SW. point, in a small bay just under some houses on rising ground there is a confined anchorage for small craft under the lee of the reef, which extends a short distance from the shore.

Rum cay is about $9\frac{1}{2}$ miles in length E. and W., 5 miles in breadth at the E. end, and 2 miles at the W. The SE. end rounds a little, and forms two remarkable white cliffs about 90 feet high, which may be seen, during the day, 9 to 12 miles off. A reef commences at the S. point of the cay, and, sweeping off nearly a mile from the shore, terminates off some dry wells at the SE. point; it is nearly steep-to, and should be carefully avoided in the night. The eastern side of the cay, to the northward, is bold and free of danger; and a bank of soundings extends from it 3 miles, and runs out in a spit to the NE. 5 miles from the NE. end of the cay, on

Rum cay.

which the depths are from 12 to 20 fathoms. The population of this cay may be about 900.

The N. side of Rum cay, from about 2 miles to leeward of the NE. point, is foul all the way to the NW. point, to the distance of about half a mile from the shore, and the soundings extend off about a mile, increasing in distance to the westward. From the NW. point a narrow spit of a dangerous reef extends out in a northerly direction for upward of 2 miles.

Temporary anchorage may be found in 7 fathoms water on the edge of soundings, off the W. side of Rum cay, with the NW. point bearing N., and the SW. point, which is low and sandy, SE. $\frac{1}{2}$ E. about a quarter of a mile from the shore. There is an excellent salt-pond at this end of the island, and the salt is easily shipped at this anchorage in moderate weather.

From Sandy point, the SW. extreme of Rum cay, the shore trends eastward to within a short distance of the S. point of the island, when it bends round to the SE. and S., forming St. George bay, at the head of which is the principal settlement, and near it a valuable salt-pond. The bank of soundings extends southward about 2 miles from the shore, with a general depth on it of from 4 to 6 fathoms, but from Sumner point, the S. extreme of the cay, the edge of the bank is fringed by a narrow, broken ledge of coral, which extends westward about 5 miles, with from 9 to 15 feet water on it, and the sea breaks in heavy weather.

Within the reef there is excellent anchorage in St. George bay, secure at all times except in the hurricane season. Vessels leaving the anchorages at Rum cay for the northward had better pass round the W. end of the cay, but they should clear Conception island before dark, as the current frequently sets strong to the NW.

Westward of the settlement is an anchorage called Port Nelson, the entrance to which is through a break in the reef about a $\frac{1}{4}$ of a mile in breadth, and the least water is 4 fathoms. The channel, however, is intricate and should not be attempted by a stranger, although the bottom is easily seen, but the least dark spot would probably mislead. Stand in with two small houses on Cotton Field point, at about $1\frac{1}{2}$ miles westward of the settlement, bearing N. until

the flag-staff bears E.; then steer for the flag-staff and anchor in 4 fathoms water, fair holding-ground, and well protected from all winds.

Commander H. D. Grant, of H. M. S. *Steady*, says the entrance through the reef is known by a white house, which can hardly be mistaken, bearing N. $\frac{1}{4}$ W.; the depth of water is about $4\frac{1}{2}$ fathoms, and a vessel can anchor anywhere E. or W. of the entrance in 5 fathoms, but not with it open, as a rather heavy swell sets in.

Or a vessel may steer in between Sandy point and the W. end of the reef fronting St. George bay. This passage is clear of danger except such as may be avoided by the eye. The *Diadem*, 50 guns, went through this passage and carried not less than 27 feet water.

The water on Rum cay is of good quality, but the supply is small. Fresh meat and poultry may be obtained.

The currents are variable, and irregular in their force. They may generally, but by no means as a rule, be expected to set strongest at full and change of the moon, and then to the NW. or SE.

Conception island is a dangerous, uninhabited islet, very irregular in shape, about $2\frac{3}{4}$ miles in length N. and S., and $1\frac{3}{4}$ miles in breadth near the centre, which is its broadest part. Its general height is about 90 feet, but close off the E. point there is a small islet $\frac{1}{3}$ of a mile in diameter and 130 feet high, called Booby cay. On the NW. side there is a clear, open bay, with good anchorage on a sandy bottom, sheltered from NNE., round easterly, to SSE. The depth is 6 fathoms at about $\frac{1}{4}$ of a mile from the edge of soundings, but farther in the bottom becomes foul.

A reef, which skirts the SW. side of the island at the distance of about $\frac{1}{3}$ of a mile, extends in a curve to the south-eastward, and terminates $1\frac{1}{2}$ miles E. of the S. point, and at its extremity there is a cluster of small dry rocks running to the northward. From 1 mile eastward of the reef the edge of the bank of soundings takes a northerly direction, passing about 2 miles eastward of Booby cay, and is full of shoals; the approach to this side is extremely dangerous, even in day-time, as the dark, rocky heads are difficult to distinguish. The bank extends off $3\frac{1}{2}$ miles from the N. side of the island and is equally dangerous; it is pretty

Conception isl
and.

clear in the centre, with variable soundings; but along its western side there is a dry reef on which the sea always breaks, and extends N. $3\frac{1}{2}$ miles from some small cays near the NW. end of the island.

On the western side of Conception island, at about $\frac{1}{2}$ a mile southward of the S. point of the NW. bay, is the entrance of a small creek leading into a lake in the centre of the island, and near the mouth there is a well of good water.

The current in the neighborhood of Conception island generally sets strong to the NW.

The outline of the Great Bahama bank is so irregular that its shape can only be understood by inspecting the chart. In describing it we will commence at Diamond point, and proceed to the eastward.

Diamond point. This point is the SW. extreme of the Mucaras reef, and forms the NE. point of the entrance to the old Bahama channel. It is extremely dangerous, being very steep-to.

It lies SE. $\frac{1}{2}$ E., $19\frac{1}{2}$ miles from Lobos cay, and E. $\frac{1}{2}$ S. from Confitas cay.

Mucaras reef. This reef extends in a NE. $\frac{1}{2}$ E. direction $6\frac{1}{2}$ miles from Diamond point. On some parts of it the sea breaks, and on others there are from 6 to 16 feet of water. This reef is very dangerous, from the fact that the dark coral and seaweed upon it give the water over it nearly the same color as that in mid-channel, and being steep-to the lead gives no warning of its vicinity.

Tide. It is high water, full and change, at the Mucaras reef at 7^h 40^m. From the N. end of the Mucaras reef the southern edge of the bank takes an easterly direction for about 26 miles, then trending to the SE. for about 25 miles, where it forms a round point called South head. In latitude $22^{\circ} 2' N.$, longitude $76^{\circ} 23' 30'' W.$, very near the extremity of the head, there is a dangerous coral head, not easily seen, as the bottom is covered with dark weed.

South head.

From South head the edge takes a NE. direction for about 22 miles, and then turns to the southward, forming a bay about 10 miles across and about the same in depth. All this part of the bank is exceedingly foul and full of coral heads and ledges, so as to be impassable for strangers.

Small vessels, however, trading between Cuba and Nassau, manage to pilot themselves across the bank here into the tongue of the ocean.

A remarkable feature on this part of the Bahama bank is dark discolored water, having the appearance of rocky ground, but which is caused by small circular holes or wells, from 13 to 24 fathoms deep, called blue holes and red holes. Holes.

The Magallanes bank is a narrow coral reef, extending about 5 miles NNE. and SSW. It is 28 miles NW. from St. Domingo cay, and 14 miles E. of South head. The depth of water varies from 5 fathoms at the N. end to 8 fathoms at the S. end of the bank. Magallanes bank.

At the SE. extreme of the above bight there is a small, dangerous coral head. From here the bank trends to the SE. and S. to San Domingo cay.

Two miles N. of the cay is the S. point of a coral ledge, lying on the edge of the bank and extending 5 miles N. and S. with as little as $7\frac{1}{2}$ feet of water on it. Between San Domingo cay and the reef the ground is quite clear, and a vessel may anchor here in 8 to 10 fathoms of water.

Northward of this reef the edge of the bank is free from danger for 10 miles, until within 3 miles SW. of the Brothers. Here there are two small coral rocks, with 2 fathoms of water on them.

At 7 miles NW. $\frac{1}{2}$ W. from these dangers is a rocky head, with 9 feet of water on it, lying SW. $\frac{3}{4}$ W. from the hill on Ragged island.

St. Domingo is a barren rock, 17 feet high, about $1\frac{1}{2}$ cables long and 200 yards wide. There is a little eminence in the centre with bushes upon it, and having the appearance, from a short distance, of a ship bottom up. A reef extends 1 mile from the cay, NE. by E.; and in the same direction, 3 miles from the cay, is a ledge on which the sea usually breaks. St. Domingo cay.

From here the edge of the bank runs NE. by N., and for the first 12 miles it is quite clear. The soundings near the edge are quite irregular, but a short distance within the depths are 8 and 9 fathoms, with a clear sandy bottom.

From the above position the bank trends easterly for

about 10 miles, and then NE. by E. 8 miles, to Verde cay. All this part is foul and dangerous.

St. Vincent
rocks.

There is a reef, nearly dry, called the St. Vincent rocks, lying WSW. $11\frac{1}{2}$ miles from Verde cay, extending 1 cable's length WNW. and ESE.

For a space of 7 miles to the NW. of these rocks the bank is full of small rocky heads, with deep water between them.

Verde cay.

Verde cay is about two-thirds of a mile long NW. and SE., covered with low sea-grape trees and prickly-pear bushes, and inhabited by large flocks of boobies and man-of-war birds. The N. end is low, but the S. point rises to a hill 72 feet high. On the W. side there is a projecting sandy beach, skirted by a ledge of rocks dry at low water, which makes landing difficult. There is anchorage under this side in 7 fathoms of water, but not to be recommended, as a heavy swell rolls round both ends of the cay in strong breezes. A small cluster of low rocks lies off the NW. point, and half a mile NNW. of them there are a few more just awash at high water, with $4\frac{1}{2}$ fathoms between the clusters, over a dark rocky ledge. From the outer rocks a shallow ledge runs off NNW. $2\frac{1}{2}$ miles.

The east side of Verde cay lies about a mile from the SE. extreme of the Great Bahama bank, which from this position takes a northerly direction for 7 miles and is quite clear of danger; it then bends round to the NW. for 6 miles, and becomes extremely dangerous. Thence the edge of the bank trends westerly about 12 miles, and in this space there are a few small shallow heads, which may be seen in clear weather, and within them the ground is clear white coral sand for 8 miles to the southward; the edge then curves a little to the southward, and trends for about 15 miles westward toward the N. end of Ragged island, and is quite clear.

Little Ragged
island.

Little Ragged island is $1\frac{3}{4}$ miles long NW. and SE., and $\frac{1}{2}$ to 1 mile broad. Its N. end is low, and separated from Great Ragged island by a little opening nearly blocked up by small cays and rocks, under the lee of which there is an excellent boat-harbor, which is entered from the westward. Off the SE. end of the island are several small, low, rocky islets, steep-to, having a depth of 4 and 5 fathoms at 2 cables outside them. At nearly $1\frac{1}{2}$ miles SE. by E. $\frac{1}{2}$ E.

from the southern islet, named South rock, and $1\frac{3}{4}$ miles NE. by E. $\frac{3}{4}$ E. from Hobson breaker, there is a small rocky patch, with 16 feet water on it, and 6 fathoms round it.

Hobson breaker is a small rock lying S. by W. $1\frac{1}{2}$ miles from the South rock off Little Ragged island, and SSE. from the stone beacon on the hill of Great Ragged island. It is just level with the sea at low water, and always breaks even in fine weather. There is a clear passage on either side of it.

The Brothers are two small black rocks about 5 feet high. The easternmost, named Lloyd rock, lies S. $\frac{1}{2}$ E. $5\frac{1}{2}$ miles from Hobson breaker, and S. by E. easterly from the above beacon; the other, called Icely, is a mile farther westward. On the S. side they may be approached within half a mile, but a dangerous coral ledge extends 4 miles to the northward of them, leaving a clear channel between it and Hobson breaker $1\frac{1}{2}$ miles wide. It will always be better, however, to pass to the northward of the breaker, between it and the shallow sand-spit which runs off about 2 miles to the WSW. of Little Ragged island.

There is good anchorage under the W. side of this latter spit in 3 fathoms water, with the S. end of Little Ragged island bearing E., and the SW. point of Great Ragged island in one with the beacon NNE. In standing in, however, take care to avoid several small coral heads which are easily seen from aloft.

Great Ragged island is nearly 4 miles long in a NNW. and SSE. direction. The southern half is about $1\frac{1}{2}$ miles broad, but the northern portion is merely a narrow neck of low land. Near the S. end a large woody hill rises to the height of 95 feet above high water, and on the summit there has been heaped up a rough pile of stones 20 feet high, which is a valuable land-mark. The island contains about 160 inhabitants, and possesses a valuable salt-pond, but supplies are scarce.

The S. end of Great Ragged island forms a sandy bay, and near the centre, not far from the shore, there is a well of good water. There is a more convenient well, and with better water, in a small bay about half-way along the W. side of the island.

Ragged Island
harbor.

At the N. end of Great Ragged island, between it and Hog cay, there is a small harbor capable of receiving vessels not over 13 feet draught. The entrance lies close to the southward of a small black rock off the SE. rocky headland of Hog cay, named Black Rock point, between it and Outer Bar reef, lying in the centre of the opening. The channel is, however, only half a cable wide, with a depth of 13 feet across the bar at low water. The ebb runs out with great force, but with the usual winds blowing strong, there will be great risk in attempting to beat out, except in a handy fore-and-aft rigged vessel that can insure staying.

In a case of sheer necessity a vessel may run in by the eye with the assistance of the plan, by bringing the Black rock on a SW. bearing; or bring the beacon 30 feet high (the base and upper part *red*, and the middle portion *white*) standing on Pig point, the SE. extreme of Hog cay, to bear SW. by W. $\frac{1}{4}$ W. and steer for it, passing between Black rock and Outer Bar reef, until Pig point and the north end of Pigeon cay are in one; then steer so as to pass half a cable from the point. But a stranger should take a pilot, who will be at hand by making the usual signal in time. Small coasters find their way out over the bank to the westward.

Tides.

The following remarks on the tides at the Ragged islands are made from a long period of observation by Mr. Duncan Taylor: "From the first of January to the last of April they rise from 16 to 18 inches, and the tide that flows an hour after the rising of the moon is uniformly 6 or 8 inches higher than the tide which flows after the setting of the moon. It frequently happens in the above months that they do not rise more than from 6 to 12 inches. The spring-tides in the above period generally rise from 6 to 10 inches more than the neaps. From the beginning of May to the first of October, the period of light winds, both tides gradually rise till they arrive at the height of from 10 inches to 2 feet 4 inches on the neaps, and from 18 inches to 3 feet 6 inches on the springs, and then continue diminishing until January."

The Jumentos.

From Great Ragged island a range of low narrow islets and small barren rocks, lying nearly on the edge of the

bank of soundings, takes a N. by W. direction for about 40 miles to Flamingo cay, which is 129 feet high, and by far the loftiest of the group. They then sweep round in a curve to the NE. and E. for 35 miles to within a short distance of the W. side of Long island. These islands are generally called the Jumentos, but the pilots and wreckers give this name only to those lying to the eastward of Water cay. These are much smaller and lower than the others; indeed most of them are only a few feet above the sea. There are several wide openings between them navigable for vessels of light draught, and which might be used most advantageously by those capable of crossing the bank; but the islets are so much alike that until they are distinctly pointed out by beacons it would be extremely rash for a stranger to attempt to pass through without a thorough knowledge of the locality and experience in the navigation of these banks.

Racoon cut, the first of these openings, is about 11 miles northward of Beacon hill on Great Ragged island; it is, however, so narrow and winding as to be difficult of access for all but small vessels, as the channel S. of the sand-spit extending a mile westward from the S. end of Racoon cay carries only 12 feet. Racoon cay has about 25 inhabitants on it, and possesses good water and a valuable salt-pond, the salt being conveniently shipped from an anchorage close under the W. side. Vessels bound here for this purpose, drawing over 12 feet, had better take the route round the S. end of Ragged island and haul in round the Darvill spit.

Racoon cut.

Nurse Channel cay, at the entrance of Nurse channel, is only 200 yards long and 21 feet high. It has a beacon on it 39 feet high. For the best track in bring the beacon to bear W. $\frac{3}{4}$ of a mile distant, which will be as soon as a depth of 10 fathoms is reached, and steer W. by S. $\frac{3}{4}$ S. till the beacon bears N. Then steer W. $\frac{1}{2}$ N. till it bears E. $\frac{1}{2}$ N. From this point a course W. $\frac{1}{2}$ S. should be kept till a distance of 14 miles from Nurse Channel cay is reached. Another channel, though not so good, lies to the northward of the cay.

Nurse channel
cay.

Man-of-war cay, on the N. side of the entrance to Man-of-war channel, lies 17 miles to the northward of Nurse Chan-

Man-of-war
cay.

Directions.

nel cay. Between it and Jamaica cay to the southward the entrance is 3 miles wide. Jamaica cay is 35 feet, Man-of-war cay 80, and Flamingo cay, 5 miles to the northward, is 129 feet above the sea, while the islets to the southward are all very much lower, so that the opening is somewhat easily recognized. Vessels drawing not more than 18 feet may cross the southern part of the bank by the charts of the United States Hydrographic Office or of the English Admiralty.

To do this the navigator should have local experience of this peculiar navigation or the assistance of a pilot. In coming from the N. or NE. with this view, the Crooked island passage should be taken, and, having verified the ship's position by sighting Bird Rock light house, a course should be shaped for the entrance of the channel which is to be used. These channels are Ragged Island channel, Nurse channel, and Man-of-war channel.

Great care must be taken in approaching the bank.

If the Ragged Island channel be used a course should be shaped from Bird rock for the hill near the S. end of Ragged island. This hill is 95 feet high, and on its summit is a beacon of stones 20 feet high, making an excellent landmark. Having made this land, which must be done by daylight, the bank may be entered upon about 7 or 8 miles E. of Ragged island. The edge at this part is easily seen from aloft.

A slight current will probably be found here setting either to SW. or NW. Should the vessel be set to the northward, Ragged island will be readily distinguished by its superior height.

Having entered upon the bank, South rock should be rounded at half a mile distance. From this point the course is W. by S. 8 miles, leaving the Hobson breaker on the port hand. When the beacon on Ragged hill bears NE. $\frac{1}{2}$ E., haul up NW. by N. 18 miles. If, after running 9 or 10 miles on this course, there should be less than $3\frac{1}{4}$ fathoms, the vessel will be a little to the E. of her course on the tail of the Darvill sand-spit, and should be kept more to the westward till these soundings are reached, and then hauled up again.

Having run the above distance, 18 miles, the course will

be NW. 25 miles, which will lead through the narrowest and worst part of the channel between the Cochinos and the Nurse sand-banks, and a good lookout must be kept for small, black, rocky patches. In running this course the depths ought to be from 4 to $4\frac{1}{2}$ fathoms at *low* water; if less is obtained the vessel will be too far to the eastward; if more, to the westward; but remember that the E. side is always the safest, and take the precaution to measure the lead-line (when wet) to *feet* between 3 or 4 fathoms, for the soundings on the chart may be fully relied on.

It is high water, full and change, here at 8^h 0^m, and the rise and fall 3 feet; scarcely any tidal stream will be felt. Should darkness overtake the vessel before having reached thus far, it will be better to anchor, which may be done anywhere in safety. It would not be prudent to attempt to beat through this part of the channel. At the end of the above course the vessel will be off the N. extreme of the Cochinos on the parallel of 22° 42' N., and a W. $\frac{1}{2}$ S. course will lead off the western edge of the bank to the southward of Guinchos cay, clear of danger, and in from $4\frac{1}{2}$ to 5 fathoms water all the way. Care, however, must be taken to keep on the above parallel by checking the latitude as often as possible.

Directions.

Through Nurse channel, the entrance to which is described on page 75, 3 fathoms may be carried, taking care to steer clear of the rocky heads. After reaching a point 14 miles W. $\frac{1}{2}$ S. of Nurse channel cay beacon the course is NW. to the parallel of 22° 42' N.

Nurse channel.

Man-of-war channel, 16 miles further N., is the best of all these passes. Here a depth of 4 to 5 fathoms may be carried on to the fair way of the bank. This may readily be done by reference to the United States Hydrographic office charts or to those of the British admiralty.

Man-of-war
channel.

A constant lookout must be kept from aloft for coral patches. When running with the wind aft, and the small clouds, called by the pilots "flyers," moving slowly, the navigator will be very apt to be deceived by their reflection on the water over the clear, sandy bottom, having the appearance of a rocky shoal. It will, always, however, be prudent to avoid a dark spot. A vessel may anchor anywhere on the bank, only looking out for a clear spot.

If approaching the bank from the SE., St. Domingo cay may be sighted and the bank entered on to the NW. of it; but this requires more than ordinary care. In this case, having rounded the SW. end of the cay within the distance of about half a mile, steer N. by W. for 20 miles, which will bring the vessel to a clear space on the edge of soundings, where she can enter, and 6 miles farther upon this course Ragged island will be sighted bearing NE., when the route can be taken described above. Great care must, however, be taken when passing the parallel of the Brothers to avoid the two shoals mentioned in page 73, for these rocks will scarcely be seen from aloft; and the run should not be made without clear daylight.

The bank may also be entered upon at Verde cay, and perhaps with less risk. In taking this route, having rounded the S. end of the cay, steer NW. 10 miles and then W. 20 miles, when the vessel will be up to Little Ragged island; but on all occasions, when among the shoals, the mariner must endeavor not to steer with the sun directly in his face, which will completely blind him from seeing them even at a very short distance.

Pear cut.

Pear cut is about 29 miles northeastward of Man-of-war cay, between Pear and Nobush cays, but it is only fit for small coasters, which find a passage from thence along the S. side of Exuma, and through the sand-bore channels into the Tongue of the Ocean.

Long island.

Long island is 57 miles long in a SE. by S. and NW. by N. direction, and at the S. end it is $3\frac{1}{2}$ miles across, but in several places farther north it is scarcely a mile wide. From the S. extreme, named South point, the western shore trends NNW. for about 14 miles, and then bends round westward, forming an extensive bay. Soundings extend from $1\frac{1}{2}$ to 4 miles off this part of the shore, and good anchorage will be found anywhere with the prevailing easterly winds. The most convenient position for communicating with Clarence settlement is with Stephenson rock bearing NW. by W. about 4 miles, in 7 or 8 fathoms water, $2\frac{1}{2}$ miles off shore, where there will be room to weigh, should the wind veer to the westward. The above rock is 25 feet high, and lies about $1\frac{1}{2}$ miles from the shore and NW. 17 miles from the S. end

of the island. The population of this island in 1857 amounted to 1,600.

Abreast Stephenson rock there is a well of excellent water near the beach.

At about $1\frac{1}{2}$ miles to the NE. of South point there are some conspicuous white cliffs about 50 feet high, and from thence the eastern shore of Long island curves slightly round, and takes a NNW. direction for 14 miles to Clarence harbor. At about 4 miles northward of South point Mavors hill rises to a remarkable sharp peak 150 feet high, and between it and the harbor the interior is cut up by numerous salt ponds. There are about 140 persons residing along the shores of this harbor.

Clarence harbor is formed between the shore and some small low islets which extend off about $1\frac{1}{2}$ miles to the NW. It is capable of admitting a few vessels of 13 feet draught, but being open to the northward, it is much exposed and frequently very difficult to get out of. The assistance of a pilot is necessary.

Wood and water may be obtained in Clarence harbor, also a small supply of beef and vegetables.

Should a vessel be forced to run into Clarence harbor without a pilot, the following directions may be useful: The S. shore of the harbor is skirted at the back by a ridge of low hills, and on the western fall of the highest part there is the ruin of a large building, and about 1 mile to the NW. of it, at the end of the ridge, a house, and near it a flag-staff. Run in with the staff in line with Harbor point bearing S. by W. $\frac{1}{4}$ W. until the ruin bears SSE., when haul up directly for it, and anchor on this line in 18 feet water just within the W. end of Strachan cay, the northernmost of the larger islets; a beacon 40 feet high, the base and upper part *red*, and the middle part white, is erected on Lark point, the SW. extreme of this cay, to point out the position of the harbor.

The channel within is little more than 1 cable wide, and the outer part generally shows itself on either side by the breakers, which extend out nearly 2 cables from the Booby rocks off the N. end of Strachan cay. Being open to the NNW., it is by no means a desirable place in the winter months for large vessels that cannot get under shelter of

the cay. The salt-ponds are close to the shore, very productive, and the salt is readily shipped.

Tides.

It is high water, full and change, in Clarence harbor at 8^h 30^m; springs rise 4 feet, and neaps 2½ feet.

Coast.

A bank of deep soundings extends out at least 4 miles to the NE. of Clarence harbor, but its exact limits have not yet been determined. From the harbor the eastern shore of Long island falls back to the westward for 5 miles, and then trends to the northward, forming a deep bight, which should be avoided, as a heavy sea generally rolls in on this side of the island, and the shore is rocky and steep-to.

From the north end of the island a reef runs off ½ a mile, and soundings extend about 2 miles eastward of it. There are also some detached reefs off the northwest point of the island, near the edge of the bank, at about 1 mile from the shore. Temporary anchorage will be found about 3½ miles SW. of the point, just within the edge of soundings, by picking out a clear spot, but be very cautious in rounding the north end of the island. From thence the bank sweeps round to the SW. toward the Exuma islands, and for about 13 or 14 miles it appears to be quite clear of danger for a space of 2½ miles within the edge. The west side of Long island is only navigable for boats and very small coasters, who manage to pick their way across by the eye to the Jumentos islets or cays.

Little Exuma
island.

Little Exuma island is about 8 miles long ESE. and WNW., but very narrow and low. Off the east end are some small cays. White cay, the most distant, is 11 miles from the nearest part of Long island. The island contains about 160 inhabitants, and the chief settlement is about 3 miles from the east end, in the vicinity of a valuable salt-pond. There is anchorage off this part of the shore, but it is an extremely exposed position, and only visited by a few small vessels, who take a favorable opportunity to ship the salt. Those employed for this purpose generally come from Nassau, with a pilot on board, and no stranger should attempt to approach this island without one.

Great Exuma
island.

Great Exuma island, which is merely separated from Little Exuma by a small shallow channel, almost fordable at low water, is about 25 miles long in a NW. by W. and SE. by E. direction, but its breadth is irregular, varying from 1

to 5 miles. The south shore is generally low and swampy, and skirted by sand-banks and small cays among which boats only can navigate at high water. The north shore is more firm and elevated, varying from 50 to 100 feet in height.

The island contains about 2,000 inhabitants, but as there are no large salt-ponds they are scattered about, and employed in raising stock and provisions; it is, consequently, only visited by small coasters, who convey the produce to Nassau. The whole of the northern shore is skirted by a line of narrow woody islets and small barren rocks, to the distance of from 1 to $1\frac{1}{2}$ miles, and within them there are several secure harbors for vessels drawing as much as 14 or 15 feet. The channels, however, are so exceedingly narrow and intricate as to be quite impassable to strangers, and even with the assistance of a pilot there would be considerable risk in a vessel of this draught beating out. Those, however, drawing 12 feet will not have this difficulty, as they can run in at the east end and out at the west.

Stocking island, the largest of the islets on the northern shore of Great Exuma, is 3 miles in length, and near the centre there is a remarkable round hill, 100 feet high, and on the summit a well-built solid stone pillar, 28 feet high, which is the first object seen from the offing, and an excellent guide. Under its western side small vessels may careen alongside the rocks.

Stocking isl-
and.

The eastern channel lies between the small low rocks, about 4 miles to the eastward of the beacon, and N. by E. of the ruins of Rolle town, which are conspicuously situated on the east end of the rising ground on Great Exuma. Man-of-war cay extends off about a mile from this part of the shore, and on its north side are the ruins of a small battery. No safe directions can be given for this channel, the pilotage depending entirely upon the eye.

Exuma harbor.

The western channel is 3 miles to the NW. of the beacon, and is much easier of access than the other. The opening between Conch and Channel cays is a mile wide, and serves to point it out, for the low small rocks lying between Stocking island and the former cay are close together. The entrance, however, is barred right across, leaving a small cut 2 cables wide close up to the reef which runs off about 2

cables from Conch cay; 21 feet may be carried through this cut into an anchorage with 5 fathoms water, within a cable of the SW. side of the above reef. It is, however, scarcely safe in the winter season, as it is quite exposed to north-westers.

The mark to cross the bar is Industry tree, (a remarkable large tree, standing on the summit of the highest hill on this part of the shore,) in line with the east side of some small low black rocks, named Smith cays, lying under it, a short distance from the land, bearing S. by W., but the vessel should be hauled up the moment she is within Conch reef, for the space is very confined. As before stated, vessels of 11 and even 12 feet may proceed as far as they like to the eastward, provided they take high water to cross the flats westward of the beacon. All these outer cays lie within about half a mile of the edge of soundings, and commence nearly abreast the middle of Little Exuma, about 3 miles from the shore.

Exuma sound.

From Great Exuma harbor, a narrow range of similar small low cays and rocks fringe the Bahama bank in a NW. direction for nearly 100 miles, when the edge of soundings sweeps round to the eastward and SE., to the S. end of Eleuthera island, forming Exuma sound.

There are several small intricate openings between the cays, leading on to the bank, the first of which, after passing Great Exuma island, is Galliot cut.

Adderley cay.

Adderley cay lies about 25 miles to the NW. of the beacon on Stocking island, and about three-quarters of a mile from the NW. end of Lee Stocking island. A stone beacon, 30 feet high, (10 feet of the middle part being red, the upper and lower parts white,) stands on the cay, to the southward of which there is a channel and harbor for small craft. There is a well of good water on the W. end of Lee Stocking island, and a cultivated salt-pond on Norman Pond cay, westward of it.

Galliot cut.

Galliot cut lies 35 miles to the NW. of the beacon on Stocking island, but the opening is so difficult to make out, so narrow and intricate, and the tides rush through it with such velocity, that it is seldom used by the smallest craft.

Conch cut.

Conch cut is 28 miles to the NW. of Galliot cut, and almost equally difficult to recognize, from the similarity in appearance of the adjacent cays, which are from 30 to 50 feet high. It has, however, more water and more easily

navigated, but still only adapted to small, handy, fore-and-aft coasters.

Wide opening, about 10 miles farther NW., is more readily recognized, by the greater distance between the larger cays, which are here 50 feet high and about 3 miles apart, forming a bight to the WNW. With the assistance of a pilot a vessel of 10 feet draught may safely navigate this channel and run across to the Tongue of the Ocean, about 30 miles westward; or under the lee of the cays, and round the E. end of New Providence, into Nassau.

Wide opening.

From Cistern cay, on the northwest side of this opening, the range of cays takes a N. by W. $\frac{1}{2}$ W. direction, becoming somewhat more elevated.

Wax cut, 10 miles north of wide opening, has water enough for a vessel drawing 10 feet, but is very narrow and intricate. The channel lies close to Snuff cay on the south side, and is only 1 cable wide in the narrowest part.

Wax cut.

Snuff cay.

Hawk's Nest cay, with a little hill on the southern part, Bush Hill cay, 60 feet high, and Little Wax cay, lie just to the southward of Snuff cay. To the SW. of the latter, about $\frac{1}{2}$ a mile distant, are the channel rocks showing above water, a cable's length apart, and joined by a bank of sand. To the northward of the channel are Horn cay and Wax cay, the latter having a height of 93 feet.

Hawk's Nest
cay.
Bush Hill cay.
Little Wax cay.

Channel rocks.

Horn cay.
Wax cay.

To enter this channel, which has a variable depth from 13 to 30 feet, keep the westernmost of the Channel rocks just open of the N. point of Snuff cay and steer in SW. $\frac{1}{4}$ W., giving Snuff cay a berth of a cable's length.

Highborn cut, 10 miles northward of Wax cut, is a much better opening to run through, but extremely difficult to beat out of. It is easily recognized by Highborn cay, which bounds the south side of the channel, being the highest of the whole range. On the hill, near the north end of the cay, there is a flag-staff 145 feet above the sea.

Highborn cut.

On the north side of this channel are the Allen cays. These cays are numerous, and on one of them, near the centre of the group, are some cocoa-nut trees. There are several rocks in mid-channel, both above and below the surface. A pilot is necessary for this channel, for it is very narrow and crooked. The U. S. Hydrographic Office and Admiralty charts of it are trustworthy.

Allen cays.

Tides. The tides run through this cut at the rate of 3 knots at the springs.

Ship channel. Ship channel, 8 miles farther N., is the northernmost and by far the best of these openings. The entrance to this channel lies between Bluff cay on the S. and the Dog rocks on the N. side. From the latter a sand-bank strewn with rocky heads extends half a mile to the southward.

Bluff cay.
Dog rocks. As the entrance is approached, an inner range of small cays about 30 feet high will be seen $1\frac{1}{4}$ miles inside of the outer islets. The northernmost of these is a bold, black rock called North rock, and having on it a beacon 50 feet high, with the upper half *red*, lower half *white*. Half a cable to the northward is the Mushroom rock, 30 feet high at low water.

North rock. Mushroom rock. Half a mile to the southward of North rock is Bush cay, with a hillock on it 35 feet high, and covered with brushwood. Still farther S. at a distance of 2 cables is South rock. At the south end of Ship channel cay, which bounds the S. side of the channel and has a small beacon on it, there are some conspicuous sand-cliffs 20 feet high, which with Highborn cay are a good guide for the opening.

Bush cay. Directions. After recognizing these rocks and cays the channel may be approached, taking care to avoid a rock with 5 feet of water on it lying in a line between the South Dog rock and Bluff cay, and one-third of the apparent width of the channel from the latter.

To enter the channel steer in to the westward, keeping the South rock just open of the N. point of Bluff cay till the beacon on North rock bears WNW. $\frac{1}{4}$ N., when haul up and run for it till in a line between the South Dog rock and Bluff cay. Then steer NW. $\frac{1}{4}$ W., which will carry the ship about half a mile to the northward of Mushroom rock, avoiding the shoal which runs off to the northward of it to a distance of 3 cables.

At the entrance to this channel the bottom is dark-colored and is in consequence deceptive, but the shallow part of the bar on the N. side generally shows itself by strong tide-rippings.

Tides. It is high water, full and change, in Wide opening at 8^h 0^m; in Wax cut, in Highborn cut, and in Ship channel at 7^h 45^m; springs rise $4\frac{1}{2}$ feet, and neaps $2\frac{1}{2}$ feet. The

tides run regularly in and out of all the above openings with great velocity, according to their breadth. In the Ship channel its rate is from 2 to 3 knots, gradually decreasing as the vessel advances upon the bank.

Vessels bound to Nassau round the west end of New Providence island, having entered Ship channel and being about half a mile north of the Mushroom rock, should steer W. $\frac{1}{2}$ S. 8 miles, or until they have brought the sand-cliffs of Ship channel cay to bear SE. by E., as the run may be influenced by the current. The course will then be WSW. 18 miles, which should take the vessel southward of the Yellow and White banks, and to a depth of 3 fathoms at low water, as will be seen by reference to the chart. Thence by steering west 8 miles it will bring her to the edge of soundings. Should the water not deepen as above, the tide will have set the vessel too far northward, and she must haul a little more to the southward until she has done so. Many small patches will be met with in the way, and by no means attempt to run in the dark, or when the sun or weather prevents the shoals from being distinctly seen. A vessel may anchor anywhere, provided she has 2 feet to spare at low water.

Directions.

Vessels drawing less than 10 feet may, after bringing the sand cliffs to bear as above, steer NW. by W. $\frac{1}{4}$ W., which will lead across the Middle ground in 10 feet at low water, avoiding the small coral heads, which are easily seen.

The small islets on the north side of Ship channel terminate about 5 miles from the entrance; thence the edge of the Bahama bank sweeps round to the eastward about 20 miles, and presents no opening whatever as far as Powell point, on the west side of Eleuthera island. Here there is a channel of 10 feet at low water.

Little San Salvador, or more properly Little Cat island, lies 9 miles to the eastward of the S. point of Eleuthera, and 10 miles SW. from the NW. end of Cat island.

Little San Salvador.

It is 5 miles long E. and W., and 1 mile broad. The space between is almost filled with small rocks and dry ledges, leaving a single intricate opening about $2\frac{1}{2}$ miles from Cat island, through which coasters carry a depth of $2\frac{1}{2}$ and 3 fathoms.

The island is connected to the south end of Eleuthera and to the Great Bahama bank by a ridge of soundings from 1 to $1\frac{1}{2}$ miles broad, on which the depths are from 10 to 14 fathoms.

Cat Island.

Cat island is somewhat in the shape of a leg and foot. The leg portion, from Columbus point to the northwest end of the island, runs nearly straight NW. $\frac{1}{2}$ N. about 42 miles; the foot or south side trends westerly about 15 miles. The breadth is from 3 to 4 miles, and its height varies from 200 to 400 feet; it is consequently the loftiest of the Bahamas; the latter height, however, is confined to a small ridge at the northwest extreme of the island. The island is very fertile and generally well cultivated; but, possessing no large salt-ponds, the inhabitants are scattered over it from one end to the other.

The northeast side of Cat island, from Columbus point to Bird point, 30 miles distant, is generally rocky, bold, and steep-to; but from thence it becomes foul, and is skirted by a reef which runs round the northwest end of the island at the distance of $\frac{2}{3}$ of a mile. There is shelter for boats within, and deep soundings will be found 2 miles outside of it.

The features of the southern shore of the island are not quite so regular. At 11 miles W. by S. from Columbus point the south extreme of the island terminates at some remarkable white cliffs. About $2\frac{3}{4}$ miles west of the cliffs a dangerous reef leaves the shore, and at the distance of $1\frac{1}{2}$ miles off sweeps eastward for nearly $7\frac{1}{2}$ miles to a remarkable bluff. About midway between the bluff and cliff there is a small cut, which admits vessels of 12 feet draught into good shelter in Port Howe. This end of the island should be avoided in the night, and very carefully approached in the day-time.

Port Howe.

To enter Port Howe, bring Williams's house, situated on a hill close to the water and easily distinguished, to bear NE. by N., and steer for it till inside the reef, when haul up sharply to the eastward and anchor.

There is an anchorage in $7\frac{1}{2}$ fathoms of water outside the reef with Williams's house bearing north.

Hawk's Nest.

A pilot should always be taken for entering the harbor.

To the west of Port Howe the land rises into a small peaked hill called the Hawk's Nest. Hawk's Nest point

underneath it is low and sandy, and a shallow spit, steep-to, extends westward from it nearly $1\frac{1}{2}$ miles. From thence the edge of soundings takes a NW. by N. direction 30 miles, to within a short distance of Little Cat island, and at about 8 miles from the west side of Cat island. It is everywhere clear as far in as the depth of 6 fathoms, and about 5 miles to the northward of Hawk's Nest point there is a clear grassy bottom, with 10 fathoms, shoaling to the eastward to 3 fathoms. On the north part of the bank deep soundings will be found closer to the shore than at the south end. With the Hawk's Nest SSW. about 4 miles the depth is $3\frac{1}{2}$ fathoms dark ground.

Eleuthera island is of a very irregular shape, and may be said to form the NE. elbow of the Great Bahama bank. It is thickly inhabited, and the soil is peculiarly adapted to the cultivation of pine-apples, which are largely exported. From Eleuthera point, the S. extreme of the island, a reef, which generally breaks, extends off $1\frac{1}{2}$ miles to the ESE. and SE., and about half a mile to the southward of the point there is a small black rock.

Eleuthera Isl.
and, west side.

From Eleuthera point the western shore of Eleuthera trends NW. 16 miles to Bamboo point, and soundings extend off about half a mile. At about 4 miles northward of the point, under Miller hill, which is about 60 feet high, good anchorage will be found in 7 fathoms water, just within the edge of the bank, but be careful to look out for a clear spot, and leave on the approach of a westerly wind.

From Bamboo point the western shore takes a NNW. direction $3\frac{1}{2}$ miles to Powell point, and here the island is 11 miles broad E. and W.; it then turns abruptly to the SE., and round to the eastward, forming Rock sound, where is situated one of the largest settlements, containing about 500 inhabitants. At about half a mile S. by W. $\frac{1}{2}$ W. from Powell point there is a small islet called Chub rock, and there are no soundings with 20 fathoms line at $1\frac{1}{4}$ miles to the SW. of it. To the northwestward of the point there are many shallow sand-ridges, on several of which low sandy cays, called schooner cays, have formed, and between which are channels capable of admitting vessels drawing less than 12 feet on the Great Bahama bank to the eastward of the Middle ground; those, however, bound

here for fruit or stock, above this draught, generally enter on the bank from the NW., through the Fleeming or Six Shilling or Douglas channels.

Tarpum bay. Tarpum bay, the next settlement on the W. side of Eleuthera, is about 9 miles northward of Rock sound. Small vessels may anchor here close to the shore, protected from the westward by numerous sand-bores nearly awash at high water. There are about 500 persons at this settlement, and there are good wells bored in the rock.

Governor harbor. Governor harbor is a small cove, about 11 miles farther northward. In entering this cove keep close to the S. point, to avoid a small rock having only 12 feet water over it, lying about half a cable off, with 3 and $3\frac{1}{4}$ fathoms between it and the shore. The anchorage is exposed to westerly winds, but with good ground-tackle and proper precaution there is no danger. The best berth is in $3\frac{1}{2}$ fathoms, with the S. point bearing SW. $\frac{1}{4}$ S. and W. end of Cupid cay NW. by W.

Water. There are some wells near the opposite shore about $1\frac{1}{2}$ miles from the village, but the water is not very good. About a mile to the northward of this, near the beach, is what is called James cistern, where after heavy rains abundance of good water may be obtained, but it is scarce in the dry season.

Pitman cove, generally called the Cove, is the northernmost settlement on Eleuthera, about 20 miles from Governor harbor. This part of the shore is bold and steep-to, and a vessel may anchor in $4\frac{1}{2}$ or 5 fathoms within half a mile of it.

Vessels bound to any of the above settlements from the westward will not have less than 21 feet water across northward of the Middle ground, on a clear sandy bottom. The depth is 15 feet on the northern edge of the Middle ground, at about 4 miles from Finley cay, which is very low and sandy, and in beating up the lead must be the guide. The channel between the Middle ground and the low rocks to the NW. is about 4 miles wide in the narrowest part, abreast the Samphire cays, from whence it gradually opens out to the NE. A vessel will have 19 feet water as far to the SE—between the Middle ground and Eleuthera—as

Tarpum bay, and 14 feet to the NW. to within a short distance of the Glass window.

It is high water, full and change, on the W. side of Eleuthera, at 9^h 0^m, and the rise and fall is from 2½ to 3 feet; but there is scarcely any tidal stream until within 5 or 6 miles of the openings. Tides.

From the S. point of Eleuthera island, the eastern shore trends northerly 32 miles to Palmetto point, and is slightly indented. It is foul almost the whole way and closely skirted by a reef with deep soundings from about ½ to 1 mile outside it. Close to the southward of Palmetto point there is a small opening through the reef carrying a depth of 8 feet, leading into a little inlet called Savanna sound, where there is also a settlement containing about 300 inhabitants; there is here a small but good salt-pond, but the fresh water is not good, the well being used by cattle. From thence the coast trends NW. by W. 17 miles to James point. To the NE. of Palmetto point there are 10 fathoms water about 2½ miles off, but thence the edge gradually approaches the shore to the distance of a mile. East coast of
Eleuthera.

At James point the reef runs off a mile to the NE., and a small spit of the bank 1½ miles beyond it. All this part of the island is low, with some sand-hills from 30 to 50 feet high, and is scarcely a mile broad. From James point the coast trends WNW. 14 miles to the Cow and Bull, two very remarkable round-headed black rocks 20 or 30 feet high at the S. end of a narrow, very low, neck of land which nearly divides the island into two parts. A short distance to the NW. of these rocks the sea has worn a large arch through the low flat ridge of cliffs called the Glass window, which is also remarkable when seen from the east or west.

From the Glass window the eastern coast of Eleuthera trends NNW. 2½ miles, and is composed of low rocky cliffs bold and steep-to. It then bends round to the westward, forming deep coves and bays all the way to the N. end of the island, and is fronted by a range of small islets, which sweep round to the northward and westward, within which there is good shelter for small coasters drawing 8 or 9 feet. The southernmost of the islets, named Harbor island, is 3 miles long N. and S. but scarcely half a mile broad; the E. side is composed of sand-hills about 50 feet, and on the Harbor island.

W. side there is a considerable town, which is considered the healthiest spot in the Bahamas; the S. end is about the same height, but rocky and woody, and is separated from the main by a narrow channel, through which vessels of 12 feet draught may enter into a small but well-sheltered anchorage named East harbor.

East harbor.

East harbor has a bar at the entrance on which the sea breaks in heavy weather, but there is not less than 14 feet at low water. The opening is easily recognized by the sand-hills to the northward, and the ridge of bold rocky cliffs to the NW. of the Cow and Bull southward of it. Bring the opening to bear SW., and run boldly in, bordering towards Harbor island, and anchor just within the bar in $3\frac{1}{2}$ fathoms water, with the S. end of that island bearing NNW. The tide runs through with great rapidity, and it is therefore necessary to moor. Vessels are prevented from going farther in by an extensive shallow sand-flat, which separates this anchorage from that off the town, and, being exposed to the NE., this place is difficult to get out of, and consequently seldom visited. It would be found, however, a safe refuge for a vessel caught in the bight between it and James point.

West harbor.

From the N. end of Harbor island a range of small low cays sweep round for about 5 miles to Bridge point, the N. extreme of Eleuthera island, and are fringed by a reef to the distance of about half a mile. The entrance for small vessels into the western harbor is through a small intricate cut, close off the point, but it requires the aid of a pilot. This end of Eleuthera rises from the shore to the height of about 100 feet, at about $4\frac{1}{2}$ miles to the southward.

N. E. bank.

From Man island, which forms the elbow of the above cays, a spit or tongue of bank about $2\frac{1}{2}$ miles broad, with 12 and 14 fathoms water on it, runs off 5 miles to the NE., and, with careful attention to the lead, it serves as a valuable safeguard in approaching this very dangerous neighborhood in the night; but the latitude is the great point to be attended to here, and, if not certain of this, a wide berth should be given to this locality, which is generally the land-fall for vessels bound into the NE. Providence channel.

Egg Island
reef.

From Ridley head, the NW. end of Eleuthera, a range of small islands extends to the WSW. for nearly 10 miles,

and are bounded on the N. by a dangerous coral ledge, called Egg island reef, to the distance of about 2 miles. The northern pitch of this reef lies W. $\frac{1}{2}$ N. 4 miles from Bridge point, and NE. $\frac{3}{4}$ N. $5\frac{1}{4}$ miles from the paps on Royal island, which, from this direction, are seen nearly in one. From this pitch another narrow spit of bank, equally valuable as a guide in the night as the NE. bank, if proper attention be paid to the latitude and lead, runs off $3\frac{1}{2}$ miles to the northward. It is about 2 miles broad, with a depth of from 7 to 12 fathoms on it.

The W. end or elbow of the reef terminates W. by N. $\frac{1}{4}$ N. $2\frac{1}{2}$ miles from the paps, and NW. $\frac{3}{4}$ N. nearly 2 miles from the hill on Egg island. Along the NW. side the depths are 9 and 10 fathoms at three-quarters of a mile from the reef, but at the elbow the edge of soundings is close to the shore. This neighborhood is very dangerous, and requires the greatest attention to the lead.

A short distance from this western elbow and outside of the reef, lie two dangerous rocks called Landrail and Lorton rocks. Landrail rock bears N. by W. from the hill on Great Egg island, and NW. by W. $\frac{1}{4}$ W. from the western pap on Royal island. Lorton rock bears N. by E. $\frac{1}{4}$ E. from the hill on Egg island, and NW. by N. $\frac{1}{2}$ N. from the western hummock of Royal island. There are numerous other rocks along the edge of this reef, having a depth of $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms between them.

Landrail rock.

Lorton rock.

George, Charles, and Russell islands, the easternmost of this range, lie so close together, that from the northward they appear as one island $3\frac{1}{2}$ miles in length E. and W.

George, Charles,
and Russell isl-
ands.

George island, the easternmost of the group of islands NW. of Eleuthera, is separated from it by a narrow channel leading round to Harbor island. On the sandy point at the E. end of the island there is a small village of fishing-huts. Russell island is woody, and about 85 feet high.

Royal island, the next and the largest of the group, is $4\frac{1}{2}$ miles in length ENE. and WSW., but very narrow. It lies parallel to and within Egg Island reef. Near the centre of the island there is a conspicuous large stone house, and about $\frac{3}{4}$ of a mile to the SW. of it are two remarkable woody paps, or hummocks, close together, and about 75 feet high. On the S. side of the island there is a snug little harbor

Royal island.

for small craft drawing less than 9 feet. In the middle of the entrance lie two small dry rocks, and on entering it will be better to pass close to either of the points, E. or W. of them. The best berth is with the house bearing N. by E. or NNE., in 10 feet at low water. At about $1\frac{1}{4}$ miles S. of the harbor there is a narrow rocky ledge nearly dry, and in working up from the SW. it will be better to keep to the northward of it.

A well of good water will be found near the house on Royal island.

Great Egg isl. and. Great Egg island is a wooded islet, about a mile long NNE. and SSW., a quarter of a mile broad, and 67 feet high. The opening between it and Royal island is a little more than a cable across, and the elbow of Egg reef terminates near the middle of the islet.

Little Egg isl. and. Little Egg island, the westernmost of the range, and lying about 2 cables southward of the above, is a narrow rocky islet, less than a quarter of a mile long and only 15 feet high. The edge of soundings comes within three-quarters of a mile to the westward of it.

Anchorage. There is anchorage in 8 fathoms of water on the edge of the bank, with Great Egg Island hill in one with Little Egg island, NNE. about a mile from the latter; but the holding-ground is not good, and a heavy swell generally rolls in round the elbow of Egg reef. Vessels drawing under 16 feet may go so far in as to bring Little Egg to bear WNW. and the paps on Royal island N. $\frac{1}{2}$ E., where they will have 3 fathoms at low water. In beating up, they may stand toward the cays by the lead, observing that the S. end of Little Egg is foul to the distance of a long half mile; when standing to the southward be careful when approaching the SW. reef.

S. W. reef. The SW. reef lies close to the edge of soundings, and its N. end about bears SE. by S. $1\frac{1}{2}$ miles from Little Egg island; it is 2 miles long N. and S., and although nearly dry it seldom breaks. At about two miles S. by E. from the S. end of the reef is the Current rock, a low, black, rocky islet; and 2 miles southward of the latter is the N. end of the Pimlico islands.

Tides. It is high water, full and change, at the Egg islands at $7^h 45^m$; springs rise $3\frac{1}{2}$ feet.

The Pimlico islands are a range of small, barren, low, rocky islets, extending 4 miles in a SSW. direction; and about 2 miles farther on are the Six Shilling cays, with the Quintus rocks $1\frac{1}{2}$ miles to the SE. of them. These cays may be readily recognized from the others by the beacons on them. At about 2 miles within the Pimlico islands is Current island, which is only separated from the W. end of Eleuthera by a narrow channel, called Current cut, through which the tide rushes with the force of a rapid.

Between the Pimlico islands and Six Shilling cays is a small and moderately high cay called Perry rock.

Fleeming or Six Shilling channel lies 14 miles to the southward of Little Egg island, and NE. by E. $\frac{1}{4}$ E. 25 miles from Nassau light-house. The opening between the Six Shilling cays and the Samphire cays, SW. of them, is 6 miles wide, but the channel is only about $1\frac{1}{2}$ miles in breadth, and lies about a mile southwestward of the former islets. It is capable of admitting vessels of 20 feet draught without much difficulty, provided they have some little knowledge of the locality.

On the southwesternmost of the Six Shilling cays is the outer or Shannon beacon, triangular shaped, 50 feet high, and visible 7 or 8 miles. The inner beacons on the Quintus rocks are two pole beacons on the southern rock; they bear NNE. and SSW. from each other, and the southernmost lies E. by S. $1\frac{1}{2}$ miles from the Shannon beacon.

When approaching the Fleeming channel from the northward, run down close to the edge of the bank, which is about a mile from the cays, and enter upon soundings with the Shannon beacon bearing E. by S., when the Quintus beacons will be just open S. of it, and then steer SE. $\frac{1}{4}$ S. This course should lead about a mile southwestward of the Shannon, and when it bears N. $\frac{1}{2}$ W. bear up SSW. $\frac{1}{4}$ W., which will lead into Douglas road or New anchorage. There are many small heads in the way, but they may be easily seen from aloft.

As the tides run right across the inner part of the channel, the flood to the SE., the ebb to NW., at the rate of 2 or 3 knots, steer accordingly so as to pass 2 cables to the eastward of a black buoy with flag, moored SE. by E. $\frac{1}{4}$ E. 2 miles from the upper or NE. Samphire cay, and SW. $\frac{3}{4}$ S.

6 $\frac{1}{4}$ miles from the Quintus poles; these latter, therefore, will be a good guide. The buoy lies in 2 fathoms water, at the inner and narrowest part of the channel, which is little more than a mile wide. A short distance to the NE. of the Middle ground buoy there is a small ledge of 14 feet, called the Middle ground, with 21 feet on either side, but it had better be left to the eastward.

When the buoy eastward of the Samphire cay bears southward of SW. by W., do not stand farther eastward than to bring the Quintus beacons in line, and to the westward keep the Pimlico islands open eastward of the Six Shilling cays. The edge of the shoal ground on either side of the channel, however, may be seen from aloft. A vessel may anchor in the channel, or take up a convenient berth for quitting, about a mile to the SW. of the Quintus rocks, but she will be exposed to the westward. The shoal ground extending southward from the Shannon Beacon cay should be carefully avoided.

Tides. It is high water, full and change, in the Fleeming channel at 9^h 0^m; springs rise 3 $\frac{1}{2}$ feet, and neaps 1 $\frac{1}{2}$ feet.

Douglas channel. Douglas channel, about 12 miles to the SW. of the Fleeming, is similarly distinguished by two pole-beacons on small black rocks, in the centre of the opening, which is about 1 $\frac{1}{2}$ miles wide between Booby island and the E. end of Rose island. It is navigable for vessels of 20 feet draught, but it is so narrow and crooked, and the tides so rapid, that a pilot is absolutely necessary. However, in the event of a vessel being forced to run in without this assistance, the following directions may be useful:

Directions. Wait for the flood tide, and strike the edge of soundings with the beacons in one SE. $\frac{1}{2}$ E., which line will lead close to the westward of Booby island ledge, and when the small pile of stones on the W. end of that island bears E. $\frac{1}{4}$ N. haul up about ESE., so as to pass to windward of the black buoy on the NE. edge of the shoal ground of the

Douglas rocks. Douglas rocks. It is seldom, however, that the wind will allow a vessel to do this; but the tide is so strong under the lee, that by proper attention she may shoot through the narrows, which is only about 1 $\frac{1}{2}$ cables wide. Should she be forced to make a board, it had better be done under the W. side of the Douglas rocks, where they are steep-to. If

under 14 feet draught, she may shoot into the southward of the beacons, but there is a very dangerous small rock, with 4 fathoms around it, right in the middle of the opening between the Douglas and South channel rocks, which, on account of the strong rippings over the dark bar that runs across, is not seen.

South channel
rocks.

If it be determined to take the latter channel a boat had better be placed over this rock, for the tide runs here so strong that without a good commanding breeze the vessel will be scarcely under control. Having passed the buoy off Douglas passage, a SE. $\frac{3}{4}$ S. course will lead between the Turtle Head and the black buoy off the north end of the Hook sand, whence the course may be gradually shaped to the SW. for Douglas road or Cochrane anchorage, guided by the eye and the chart.

Turtle head.

A convenient berth will be found in about 4 fathoms water, sand and marl, with the Block house on Potter cay nearly in one with Montague fort on New Providence W. by N., and the house on Rose island N. $\frac{1}{2}$ W., about 8 miles from the town of Nassau. An anchorage may also be taken up a short distance within the Douglas channel in Shoe-hole road in 4 or 4 $\frac{1}{2}$ fathoms, but it is not good holding-ground, and in a strong norther vessels are liable to drag. The sea in these winds seldom breaks across, and they may, therefore, run in here when the bar at Nassau is impassable.

Cochrane an-
chorage.

Shoe-hole road.

There are wells of excellent water near the house on Rose island, but difficult and inconvenient to get at.

Water.

It is high water, full and change, in Douglas channel at 8^h 30^m; springs rise 4 feet, and neaps 2 $\frac{1}{2}$ feet.

Tides.

Rose island is 9 miles long E. and W., but very narrow and surrounded on all sides by small rocky cays and coral patches, among which, on the north side, are Sandy and Green cays and Great and Little Porpoise rocks, reaching off to a distance of 1 $\frac{1}{2}$ miles.

Rose island.

Sandy cay.

Green cay.
Porpoise rocks.

On the south side the island is skirted by rocky patches to a distance of 2 miles. They limit to the northward the large roadstead known as Douglas road, New anchorage, or, more frequently, Cochrane anchorage.

As the water is very clear these dangers may be easily distinguished by the eye.

Green cay anchorage.

To the SW. of Green cay there is a snug anchorage for small vessels, well sheltered, except to the westward. To enter it, haul round the west end of Green island at 2 cables' distance, to avoid the rocky ledge which extends from it, and anchor in 3 fathoms of water with the west point of Green cay bearing NNW. and the south point of Sandy cay bearing W.

This anchorage is unsafe with NW. winds.

Hanover sound.
Salt cay.

The entrance to Hanover sound lies between Salt cay and Rose Island rocks, but is very much narrowed by shoals on both sides.

Athol island.

The anchorage lies between Salt cay and Athol island, and is a good berth for two or three vessels drawing under 18 feet. As the entrance is only a cable wide and open to the NE, it is difficult for a sailing-vessel to get out, and in the winter season she may be detained a long time.

In approaching this anchorage from the NE. care must be taken to avoid the range of low islets and coral patches which skirt the north side of Rose island to the distance of $1\frac{1}{2}$ miles, and outside of which soundings extend for three-quarters of a mile.

The leading mark into the harbor is a remarkable conical bush on New Provide ice island, near the Creek village, just open east of the quarantine officers' house on Athol Island.

Steer in on this line till the east point of Salt cay bears N. by W. $\frac{3}{4}$ W., when haul up S. by E. $\frac{3}{4}$ E. and anchor in 3 fathoms of water with the west end of Rose island rocks bearing NE.

A pilot should be taken if one can be obtained.

Light.

From the quarantine officers' house on Athol island a fixed white light is exhibited, visible from a distance of 9 miles between the bearings of NNW. $\frac{1}{2}$ W. and W. by N. $\frac{1}{2}$ N.

Salt cay anchorage.

Salt cay is a little more than 2 miles long, but very narrow. Under its western point is a snug anchorage for two or three vessels of 14 or 15 feet draught.

There is a rocky ledge with 13 feet of water on it, reaching off a quarter of a mile from the west end of Salt cay, where the sea only breaks with strong NW. winds.

To enter it bring the flag-staff on Fort Montague to bear S. by E. $\frac{1}{2}$ E., when it will be well open to the eastward of

the southernmost of the Pork-fish rocks, a group of three rocks lying N. of Hog island. Steer in on this course till Hog Island light is brought on with the middle of the largest and northernmost of the Pork-fish rocks, when haul up E. by N. and anchor in about 3 fathoms to the SE. of the W. point of Salt cay. Fort Montague is on the NE. point of the island of New Providence.

It is high water, full and change, in Hanover sound at 8^h 15^m; springs rise 4 feet, and neaps 3 feet. The flood runs to the SW., the ebb to the NE.

Hog island, lying a quarter of a mile off the N. shore of New Providence island, is 3½ miles long E. and W., and forms the N. side of Nassau harbor. The western end gradually falls from low sand-hills to a flat, rocky point, on which is a conical white stone light-house, 58 feet high, which exhibits a *fixed* white light at 68 feet above high water. The light is visible when bearing from SW. round by S. to SE., and may be seen 10 miles off, but it is only intended for the purposes of a harbor light.

Whenever the state of the bar at Nassau is such as to be considered impassable or dangerous to vessels entering the harbor, a red light is exhibited from a flag-staff near the light-house.

Silver cay lies 6 cables westward of Hog island, and half a mile from the shore of New Providence. At about 2 cables farther westward is Long cay, and 1½ miles beyond this is North cay. There is a navigable opening for small vessels between the two latter cays; and also an opening through the foul ground about a mile to the westward of North cay, leading into Delaport bay, a small anchorage for vessels of light draught, but seldom used. The shore to the westward of these cays should not be approached nearer than a mile.

New Providence island being the seat of government, and possessing a safe harbor for a few vessels of 15 feet draught, is the most important island of the Bahamas. The island is oval-shaped, 16½ miles long E. and W., and 6¼ miles at its broadest part. A narrow ridge of wooded hills, from 80 to 120 feet high, skirts the northern shore almost the whole way. The town of Nassau stands on the northern slope of the ridge, about 5½ miles from the E. end of the island, and

is one of the most picturesque and well-built towns in the West Indies; it affords good water and supplies of all descriptions, and convenient means for repairing vessels. There is a marine railway on Hog island capable of lifting vessels of 1,000 tons. The charge is 50 cents a ton for docking and 25 cents per ton each day afterward. Coal can generally be obtained. Provisions are of moderate price. At Cave point, about $6\frac{1}{2}$ miles from the W. end, a narrow fork of the ridge, called the Blue hills, from 100 to 130 feet high, branches off toward the centre of the island, and N. and S. of it are large lakes of brackish water, from 6 to 12 feet deep, which are slightly influenced by the tides.

The southern portion of the island is low, and covered in great part with extensive pine barrens or woods; the shore is generally sandy and swampy, and shallow, flat sands run off from it to some distance. An excellent carriage-road runs all along the northern shore, and another crosses the island from the town to the Blue hills. The N. side is skirted by several small, low cays, covered with brushwood, and within less than half a mile of the edge of soundings.

Anchorage. Besides Nassau, the anchorages are Delaport bay, West bay, and Southwest bay.

Nassau harbor. The entrance to Nassau harbor lies between Hog island and Silver cay; but between them a rocky bar runs right across, which breaks heavily with strong NW. and N. winds, and is sometimes impassable for several days. The greatest depth at low-water springs is 17 feet, but this is only in a space not 50 yards wide, and, as stated before, vessels drawing over 15 feet cannot enter safely.

Directions. When bound to Nassau from the N. or NE. a wide berth should be given to the NE. elbow of the Little Bahama bank, until the parallel of $26^{\circ} 30'$ N. is reached. Approaching from the eastward the latitude of $25^{\circ} 45'$ N. should be most carefully maintained until either the N. end of Eleuthera, which may be seen about 12 miles off, is sighted, or the Abaco light-house, which is visible in clear weather 16 miles.

The current, as the Bahama islands are approached from these points, and also from the E. and SE., generally runs to the NW., but not strong. To the northward of Eleuthera, however, a strong set in the opposite direction will

sometimes be found after NW. and N. winds, and probably after fine weather, on the increase of the moon, but it will be safer not to depend upon this. Should the land of Elen-thera be made, haul round Egg Island reef at the distance of 3 or 4 miles; and when Great Egg island bears E. the course will be about SW. by S., and the distance nearly 32 miles to Nassau light-house.

The first objects seen, when approaching Nassau harbor, will be forts Fincastle and Charlotte, and soon after the government house, a large square building on the top of the ridge, between them. When near the entrance a stone obelisk will be observed on the hill, a short distance to the eastward of fort Charlotte, which is the westernmost fort; and when the light-house bears S. distant about half a mile, a small, low rock will be opened out close under the land, called Tony rock, on which is a pole beacon with a triangular frame on the top. The obelisk and beacon in one, bearing S. by W., will lead over the deepest part of the bar westward of a *red* buoy on the extremity of the spit from Hog island, and eastward of a black buoy on the Hog-fish bank; when the flag-staff on the W. end of Hog island comes in line with the windows of the light-house, haul sharp up to the SE., with the bathing-house on the end of the ordnance wharf in one with the Presbyterian chapel, bearing in mind that the flood will set the vessel strong toward the sand-ridges on the E. side of the channel.

The latter mark will lead eastward of Tony Rock ledge, at the north end of which there is a small black spar-beacon, and westward of the *red* buoy marking the west edge of the sand-ridges. When the cupola of the jail, a conspicuous building in the centre of the town, comes in one with a small lookout house on the ridge, a little to the eastward of fort Fincastle, haul up on this line, and anchor with Tony Rock beacon in line with a cocoa-nut tree on North cay W. by N. abreast the navy-yard, ordnance wharf, or barracks, as most convenient. In entering, the *red* buoys and beacons will be left on the port hand, and the black buoys on the starboard.

Should the wind be scant a vessel may sail in or out of the harbor, with the bathing-house on the ordnance wharf in one with the Presbyterian chapel, provided there is no

swell on the bar, and she crosses it at the last quarter flood, which is the best time for that purpose. It is clear, however, that these directions can only be of use to those fully acquainted with the place, except in a case of the greatest emergency. Handy vessels that can insure staying may beat in, but this must be done entirely by the eye. Every confidence may be placed in the pilots, who are always at hand. Vessels of 14 or 15 feet draught had better moor head and stern, with their head to the westward and the best bower to the eastward, and be careful in swinging not to tail on the anchor. In the summer season, after the period of northwesterners, it will perhaps be more convenient to have the vessel's head to the eastward.

If the harbor is approached with a northerly wind, and there is an uncertainty as to the state of the bar, should it be dangerous to cross, a *red* flag will be hoisted on the signal staff near the light-house, and at night a *red* light exhibited. In this case it will be more prudent to proceed to the Douglas channel, page 94, or to the anchorage at the southwest end of the island. Should it be passable, but too dangerous for a boat to get out, a *white* flag will be hoisted, and the pilot-boat will be seen in waiting just within the breakers, showing a flag *red and white* horizontally. In this case, cross the bar upon the first leading mark, the beacon and obelisk in line, and when the flag-staff comes on with the light-house, steer for the boat and receive the pilot. This, however, is a dangerous experiment for a vessel of heavy draught; and, except in a case of great urgency, it will be far more prudent to act as above stated.

Should a strong northwester overtake a vessel at the entrance of either of the Providence channels, it will perhaps be better to remain under the lee of the south end of Abaco, or anchor under the west side of the Hole in the Wall, and wait until the wind moderates and the sea goes down. It may still continue to blow hard as the wind draws round to the NE., but when it reaches this quarter the sea generally subsides on the bar in a short time. A good sheltered berth will be found under Abaco in 11 fathoms water, with the light-house E. by N. $\frac{1}{4}$ N. about three-quarters of a mile from-shore.

Vessels merely wishing to communicate with Nassau, or with the wind to the southward, will find a temporary anchorage off the north side of Hog island, in about 8 fathoms, on the very edge of soundings. This anchorage must, however, be approached under easy sail, and care must be taken not to shoot too far in; in the winter months be prepared to quit the moment the wind threatens a change.

Outer anchor-
age.

The best berth is with Government house bearing SSW. just open to the eastward of Christ church and Hog island light-house W. by S. $\frac{3}{4}$ S.

The light-house must not be brought to the westward of this bearing on account of the shoals which run off the north side of Hog island.

Vessels drawing under 11 feet draught may enter Nassau harbor from Douglas road or Cochrane anchorage (page 93), but this is only to be done by the eye. A depth of 9 feet may be carried at low water over the eastern flats off fort Montague, and the channel lies close under the south sides of Athol and Hog islands.

Eastern chan-
nel.

It is high water, full and change, in Nassau harbor at 7^h 30^m; springs rise 4 feet, and neaps 3 feet.

Tides.

The west end of New Providence forms a small bay, which affords good shelter for small craft drawing 7 feet water from all points but the west. Directly off the middle of the entrance, about a mile from either point, is Goulding cay, a narrow, low, rocky islet about 3 cables in length east and west, and steep-to on the south side, but a reef, which generally breaks, extends off a quarter of a mile to the NW. from its west end, and here are deep soundings about 2 cables beyond it. The channel into the bay lies to the NE. of the cay.

West bay.

Between the east end of Goulding cay and Clifton point, which forms the eastern extreme of the island of New Providence, the ground is very foul, with rocky heads having deep and intricate channels between them.

To enter West bay bring the group of cocoanut-trees on Clifton point a little open to the westward of Clifton bluff, and steer for them. As soon as the vessel is on a line between Simm's point on the north side of the bay and the east end of Goulding cay, haul sharply to the eastward and

anchor anywhere to the southward of Lyford cay, only taking care to avoid a shoal spot of six feet a quarter of a mile WSW. from Simms point.

S. W. bay.

The southwest end of New Providence is formed of remarkable bold perpendicular white cliffs about 30 feet high. The best anchorage will be found with Clifton bluff NW. $\frac{3}{4}$ N., and the south extreme of the island E. $\frac{3}{4}$ S., in $4\frac{1}{2}$ fathoms water, just on the edge of soundings, and about half a mile off shore. A vessel may go farther in, according to her draught, and guided by the lead. Should she have to work up, be very careful to avoid a small rocky patch of 11 feet, lying close to the edge of the bank, with the bluff bearing NNW. $\frac{1}{4}$ W. nearly 2 miles, and the Conch rock E. by S. The latter, however, is only about 8 feet high, and so small that it will scarcely be visible from the deck of a small vessel. A vessel may also anchor southward of this patch in $5\frac{1}{2}$ fathoms, with the bluff NNW. $\frac{1}{4}$ W. and the above rock east. It is high water, full and change, in SW. bay at 7^h 30^m; spring-tides rise 4 feet, neaps 3 feet. The flood runs E. by S., ebb W. by N., $\frac{3}{4}$ of a mile an hour.

S. W. reef.

This very dangerous rocky ledge lies on the edge of soundings S. by E. $7\frac{1}{2}$ miles from Clifton bluff. It is nearly awash, and the ground is foul for a mile to the northward of it.

From SW. reef the edge of the Bahama bank takes a SE. by S. direction for 28 miles, and is very foul, there being several rocky heads nearly awash, and it is consequently dangerous to approach in the night. Thence it trends S. $\frac{1}{2}$ E. 28 miles farther to Green cay.

This part is clear, but so steep-to that there are sometimes only $3\frac{1}{2}$ fathoms on the brink of soundings.

From a point on the edge of the bank, about 9 miles south of SW. reefs, in latitude $24^{\circ} 46'$ N., a channel leads NE. $\frac{1}{2}$ E. between the points of Conch spit and White bank to Cochran anchorage, and having 12 feet in the least depth.

From this point also a 15-foot channel, avoiding the rocky heads, leads across the bank into Exuma sound through ship-channel, (see page 84.)

Green cay.

Green cay is a mile long, and 60 feet high near its centre. To the southward of it and just on the edge of the bank, which

is her every steep to, anchorage may be found. It requires very great care not to shoot too far in.

SE. $6\frac{1}{2}$ miles from Green cay are the Booby rocks, about 20 feet high.

Two miles farther eastward are the Twin rocks, 15 feet high, and from these rocks a patch of coral heads reaches nearly 6 miles to the eastward, ending in the Pimlico rocks.

These dangers are on the edge of the bank, which is very steep-to, and from here sweeps round to the eastward and then to the southward. This part of the bank is impassable.

On the south side of the Tongue of the Ocean there are several small channels leading across the bank to the SE. and southward, available for vessels of light draught. South side channels.

They are called Queen's, Blossom, Thunder, and Lark channels. Through Thunder and Blossom channels vessels of 14 feet draught may pass.

The navigation depends entirely upon the eye, but is not difficult.

The white sand-ridges between the channels take a SE. direction and commence a short distance within the edge of the bank. The depth at the N. end of the entrance is from 5 to 6 fathoms, generally over dark bottom, so that the channels are well defined by the sand-ridges on either side, and are easily made out from aloft; but toward the SE. end the sand-ridges meet, forming a bar with from 3 to $3\frac{1}{2}$ fathoms of water on it. Coming from the southward, therefore, the channels are not so easily discovered. The tides run rapidly through and sometimes across these ridges, so that the navigation is unsafe in the night. A vessel may, however, anchor anywhere between them. From the entrance to Queen's channel the edge trends to the NW. and is clear for about 8 miles, but from this point it is full of rocky heads and reefs all along the western side of the Tongue of the Ocean.

South cay is a small barren cay 18 feet high, and is the southernmost of the chain of rocks and cays lying the W. side of the Tongue of Ocean. South cay.

From its S. point a reef runs off 2 miles SSE. To the southward of this reef is the entrance of a channel called by Admiral Kerhallet SW. channel, leading across the

Washerwoman's cut.

bank to the Old-Bahama channel, W. of the Guinchos cays. Thirteen feet may be carried through this channel on a SW. $\frac{1}{2}$ S. course, keeping a good lookout for rocky heads. Five and a half miles NNW. of South cay is the entrance to Washerwoman's cut. The chart will be the best guide to this channel, which also crosses the bank to the SW. The navigator should never undertake to run through these channels with the sun ahead of him.

The entrance to Washerwoman's cut is to the northward of the Dolly cays and Sister rocks and S. of Pigeon cays, 36 feet high. Through it 13 feet may be carried across the bank.

Hurricane hole.

This entrance also leads to Hurricane hole, a snug anchorage for vessels of small draught, to the NW. of Pigeon cays.

Andros island.

Andros island, about the largest of the Bahama islands, is 90 miles long NNW. and SSE., and forms the W. side of the Tongue of the Ocean. The southern part of the island is from 18 to 20 miles broad, but near the centre, between High cay and William point, it is 40 miles across, and from thence it gradually decreases in the breadth of about 10 miles at the N. end. The whole island is low, swampy, thickly wooded, and intersected by numerous shallow creeks, which almost cut the island into three parts at high water. Along the eastern side, however, from High cay to the southward, there is a narrow ridge of hills from 70 to 90 feet high. This shore is skirted by numerous small cays and reefs to the distance of from 1 to 2 miles, and being steep-to, is very dangerous, particularly in the neighborhood of High cay, where the tongue is only 15 miles across. The western shore of the island is composed of slimy mud, like pipe-clay, and is so low that, in NW. gales, it is overflowed to a considerable distance inland. The water is here so shallow that in some places a boat cannot come within many miles of the shore.

There is no harbor whatever, but boats and small craft drawing 4 or 5 feet find their way through the reefs on the eastern side of the island, into some of the creeks, for the purpose of collecting sponge, which is found in large quantities, and shipping the wood which is floated into them from the lagoons in the interior. There are but few inhabitants,

and the only settlement of consequence is at Red bay, near the NW. end of the island. From this end an extensive flat of sand, dry in many places at low-water, runs off 12 miles to the NW., and on it are several small islets, the northernmost of which are called Joulters cays. About 2 miles to the northward of Morgan's bluff, a remarkable rocky headland forming the NE. point of the island, there is an opening in the reef, abreast a small rock called Golding cay, and it will admit a vessel of 9 feet draught into shelter within, in moderate weather.

Joulters cays.

Golding cay.

It is high water, full and change, on the E. side of Andros island at 8^h 0^m, on the W. side, off the N. end, at 10^h, 30^m, and off the S. end at 1^h 15^m. The tidal streams meet in the centre of the bights, where the rise and fall is only from 12 to 18 inches, and the flood runs from the westward through the great bight, 3 hours after high water.

Tides.

From Morgan's bluff, the NE. point of Andros, the edge of the Bahama bank trends NNW. 18 miles, and then turns suddenly to the ESE. along the S. side of the Berry islands. At the head of this bight there is a narrow intricate channel between sand-ridges, through which may be carried a depth of 10 feet at low water on to the bank, and it is usually used by the wreckers. These small vessels leaving Nassau generally anchor under the Chub cays for the night, and contrive to be at the entrance of the channel by sunrise, in order to be able to see 'the numerous heads which skirt the edge of the bank for about 1½ miles inward before they come to the sand-bores. The clearest route will be found by striking soundings with Blackwood bush, (a small, low, bushy cay, the westernmost of the Berry islands,) bearing E. by N. ¼ N. 5 miles.

N. W. channel.

The Berry islands are a group of small narrow wooded cays, from 50 to 60 feet high, which, from Blackwood bush, sweep round to the eastward, forming nearly a semi-circle 23 miles in diameter. The western side is quite blocked up by shallow sand-banks, but to the eastward the islets are skirted by a flat bank of soundings, having from 10 to 14 fathoms to the distance of from 5 to 8 miles to the eastward, and is a good guide in the night. At 1½ miles E. by S. ¾ S. from Blackwood bush there is a small low islet called Rum cay. Soundings run out 1½ miles between these

Berry island.

Bush cay.

Rum Cay.

cays, and the ground is very foul. At $6\frac{1}{2}$ miles farther on in the same direction is South Stirrup cay, which is covered with trees growing out of a swamp to the height of 35 feet.

Chub cays. A mile to the eastward of South Stirrup cay are the Chub cays, with several detached rocks lying just inside the edge of soundings.

Thompson cay. Under Thompson cay, which is separated from the E. end of Chub cay by a very narrow channel, a vessel of light draught may find shelter.

Frazer's Hog cay lies 2 miles S. E. of Thompson cay and has a snug three-fathom anchorage under it.

Whale cay. Whale cay lies at the SE. extreme of the group and forms an elbow to the NE. and N. $4\frac{1}{2}$ miles long; at the N. end

Whale point. there is a single house. The western end is called Whale point. About a mile east of it are some remarkable sand-cliffs, 80 feet high. The flat bank of soundings E. of the Berry islands commences at the turn of the elbow of this

Little Whale cay. Just to the northward of Whale cay lies Little Whale cay, easily distinguished by some white bluffs, 80 feet high.

Bond's Cay Cut harbor. Bond's cay, the next islet northward, is $3\frac{1}{2}$ miles long. The anchorage to the southward of it is called Bond's Cay Cut harbor. This harbor is sheltered to the eastward by a

Sister rocks. ledge nearly dry connecting Bond's cay with two remarkable small rocks called The Sisters, and is a snug anchorage for small craft.

The channel lies to the southward of The Sisters, and the eye will guide the vessel through in from 10 to 15 feet.

Tides. The tides are strong in all these passages between the cays and sometimes run at the rate of three knots.

The flood runs to the west, the ebb to the east. It is high water, full and change, at 8^h.

Frozen cay. Frozen cay is the easternmost of the Berry islands, and is so called from the resemblance of the pointed rocks composing it to masses of ice.

Anchorage. The cut between it and Bond's cay is half a mile wide, but foul and impassable. Round the N. end of Frozen cay a vessel can carry 15 feet water into an anchorage on the W. side with 3 fathoms water, open, however, to the NE.

Little harbor, Holmes, and Market Fish cays occupy a space of about 8 miles in a NNW. direction, and are only separated by small shallow cuts. In the centre of Holmes cay

are some conspicuous white cliffs. The shore to the northward of these cays is foul to some distance, and the Market Fish cays should not be approached from the NE. within 2 miles. Between Market Fish cay and Haines cay, which bears WNW. from it, there is an opening 3 miles wide and an anchorage in it for small craft.

Ambergris cays, to the westward of this anchorage, are surrounded on the N., W., and S. sides by extensive sandbanks, nearly dry. These islets are covered with brush and cocoa-nut trees. Ambergris cays.

Haines cay is about 3 miles long N. by W. and S. by E., and its N. end terminates in a white sandy bluff. To the northward of the bluff there is a small rocky islet called the Hawk's nest, under which there is good boat-shelter. Haines cay.
Hawk's nest anchorage.

Great Harbor cay, about 60 feet high, is nearly connected to Haines cay, and is the largest of the Berry islands. It is 6 miles long, a mile broad in the centre, and has a few settlers. Its eastern shore forms several sandy bays, separated by low white stone cliffs. Near the centre, at about three-quarters of a mile off shore, there is a small islet called Petit cay, with a boat-channel within it. Shallow rocky ground extends from the NW. end of this islet to within about $1\frac{1}{2}$ miles of the N. end of Great Harbor cay, and a wide berth had better be given to it. The soundings are so regular that in the night-time they scarcely give warning of approach, and great care must be taken not to come within the depth of 10 fathoms. Great Harbor cay.

Anderson, Bamboo, Cistern, and Lignum-Vitæ cays lie on the W. side of Great harbor cay and are only separated by small boat-channels. On Anderson and Cistern cays there are remarkable clumps of dark trees 100 feet above the sea. Between the latter and Bamboo cay there is a small snug inlet, called Bullock harbor, for coasters drawing 8 feet. The channel is through Great harbor, between Goat and Lignum-Vitæ cays, or from the westward round Little Stirrup cay. Anderson, Bamboo, Cistern, and Lignum-Vitæ cays.

Great Stirrup cay, the northernmost of the Berry islands, is a necessary landmark for vessels intending to cross the bank from the NW. Providence channel to the westward. It is woody, $1\frac{3}{4}$ miles in length E. and W., a quarter of a mile in breadth, and about 60 feet high. The N. side pre- Great Stirrup cay.

sents a bold rocky shore, with 3 and 4 fathoms water close-to, except at the western end where it is not so steep, and the edge of soundings is about a mile distant. At about half a mile from the W. end there is a small sandy cove and some wells of good water, and landing is generally easy, except with northerly winds. In moderate weather, with the prevailing easterly winds, a vessel may anchor in 7 fathoms, sandy bottom, with a flag-staff on the hill S. $\frac{3}{4}$ E., about three-quarters of a mile off shore. A small supply of stock and vegetables may also be obtained.

Light.

At about a third of a mile within the E. end of Great Stirrup cay is a circular tower, 46 feet high, painted with red and white bands alternately, and exhibiting at 81 feet above high water a *fixed* white light, visible from a distance of 12 miles, except between the bearings of NW. by N. and NE., in which direction it is hidden by the land.

This, as well as other lights on the Bahamas, can probably be seen from a greater distance than estimated in the light-house lists.

Great harbor.

Great Stirrup cay is separated from Great Harbor cay by an opening 4 cables wide, and within it there is a limited anchorage, with a depth of $3\frac{1}{2}$ fathoms, called Great Harbor. This place, however, is completely exposed to the NE., and, except in a handy fore-and-after, a vessel might meet with considerable detention. Those under 10 feet draught can get close up under Great Harbor cay, or lie more snugly in Pantan cove at the SE. end of Great Stirrup cay. Goat cay, which is about half a mile within the opening, forms a remarkable steep, rounded, woody hill 80 feet high.

Directions.

Should a vessel be forced to run for the anchorage in Great harbor, bring the S. end of Goat island to bear SW. $\frac{1}{4}$ W. and just clear of the N. end of Great harbor cay, which is bold and steep to to the distance of a cable. This mark will lead just clear of the E. end of the bar which extends out from Stirrup cay; give the N. end of Great harbor cay a berth of rather more than a cable, and anchor with it bearing E. in 3 fathoms water; or shoot the vessel farther into the SE. of the point, according to her draught.

Slaughter harbor.

Slaughter harbor is a small basin, between Great and Little Stirrup cays, scarcely 2 cables in diameter, but has a depth of 15 to 18 feet. The channel, however, is barred,

and only navigable at high water with the assistance of a pilot, for vessels drawing 12 feet. It is quite open to the northward, but the bar, which generally breaks across with this wind, protects the anchorage.

In case of necessity the following directions for entering may be of use: Bring Harbor rock (lying one-eighth of a mile N. of the W. end of Great Stirrup cay) to bear S. and steer for it. Pass it close to on the port hand, and as soon as it is passed haul sharply up to port till the rock bears NNE. $\frac{3}{4}$ E., when steer SSW. $\frac{3}{4}$ W. across the bar in 10 feet of water, keeping the rock on the same bearing. Anchor in 17 feet as soon as the NE. point of Little Stirrup cay bears W.

It is high water, full and change, at Great Stirrup cay at 7^h 0^m; the rise at springs is 4 feet, and the tidal streams run directly in and out of all the above openings with great rapidity. Tides.

From abreast the Stirrup cays the northern edge of the Great Bahama bank takes a westerly direction, with a slight bend to the southward, for about 35 miles, to the E. end of the Gingerbread ground. In this space it is quite free of danger and the lead will be a safe guide. Northern edge
of the Bahama
bank.

The majority of sailing-vessels bound from Europe and the Atlantic ports of North America to Cuba, Key West, and the northern ports of the gulf of Mexico run through the NW. Providence channel. Those drawing more than 12 feet must pass outside the Great Bahama bank, but vessels of that draught or less may cross the bank from the vicinity of Great Stirrup cay to a point about 14 miles S. of Orange cay, saving about 55 miles of distance.

To cross the bank, having brought the light-house on Stirrup cay to bear ESE. distant about 4 miles, steer SW. $\frac{1}{2}$ W., and from the edge of soundings run 32 miles to the commencement of the flats or Middle ground, which extends right across the bank, and is about 15 miles in breadth. Thence a SW. $\frac{1}{2}$ S. course, 66 miles, leads 5 or 6 miles eastward and in sight of the Orange cay, and to the edge of the bank about 13 or 14 miles southward of it. Or, from a position 4 miles WNW. of Stirrup cay light-house, a

vessel may steer about W. by S. $\frac{1}{2}$ S. for the buoy on the N. end of the Mackie bank, distant about 40 miles, and, having seen it, steer to the southward and correct her position by the buoy on the south end of the bank.

Mackie Bank
buoys.

A black buoy with staff and basket-work ball lies in 2 fathoms of water at the northeast part of the Mackie bank, Great Bahama, in lat. $25^{\circ} 40'$ N., long. $78^{\circ} 40' 31''$ W.; also a chequered black and white buoy with staff and two chequered basket-work balls, in 2 fathoms at low water, on the SE. edge of the bank, in lat. $25^{\circ} 28'$ N., long., $78^{\circ} 45' 25''$ W., bearing S. by W. $\frac{3}{4}$ W., nearly 13 miles from the NE. buoy. These buoys are intended to guide vessels in crossing the Bahama bank and to correct their positions in running from Stirrup cay to Orange cay; they are visible at 5 or 6 miles distance.

If it is desired to leave the bank between the Riding rocks and Orange cay, after steering 25 miles on a S W. $\frac{1}{2}$ S. course as above, steer W. $\frac{1}{2}$ S. 25 miles and the western edge of the bank will be reached.

In crossing the flats the eye must guide the vessel between the numerous clear white sand-ridges and small black heads, which are easily seen, even in the night-time, if the weather is clear. Some attention, however, should be paid to the tide on the first course. Should the vessel enter upon the bank with the first of the flood with a commanding breeze, she had better steer half a point farther to the westward, and the contrary on the ebb, judging at the same time according to the depth, which should gradually decrease up to the sand-ridges.

Elbow bank.

Although the water is so shoal and clear, the lead should be well attended, and the line marked to feet, (when wet,) as the vessel may be set by the tide too far to windward on the Long banks, or on the Elbow bank to leeward, which will be indicated by the gradual decrease of depth, as she approaches either way, should the wind be scant. If she gets to the eastward of the track, toward what is called the Long bank, the little heads of sponge and dark fans will become more numerous. In the winter months, should the wind haul to the southward, a sure indication of a north-wester, instead of beating about among the shoals it will be

Long bank.

better to anchor and await the change that will soon follow.

It is high water, full and change, at 8^h 0^m, and the stream runs from one to half a knot an hour to within a short distance of the N. side of the Middle ground. On the flats there is very little set, and on the S. side of the Middle ground the stream goes regularly round the compass from E. to S. and W., from high to low water and the contrary. On the parallel of 25° N., about 16 miles eastward of Orange cay, it is not high water before 10^h 15^m, and the rise is 3 feet, so that a vessel will carry two hours more of high water across the shallowest part of the bank; therefore by entering upon the SW. by S. course at three quarters flood a steamer of 13 feet draught may cross the flats before the tide begins to fall.

Tides.

From a point 30 miles W. of Little Stirrup cay a very dangerous ledge of rocks and low cays called the Gingerbread ground extends westwardly to the Great Isaac, a distance of 30 miles. It is from 2 to 5 miles in width, and, as it lies close to the edge of soundings and is not easily seen from a distance, many ships have been lost upon it. There are several low rocks upon it noticed below, and several cuts through it, but except in case of emergency, strangers had better avoid them.

Ginger - bread ground.

The Little Isaacs, the easternmost of these rocks, are three in number. The easternmost, called East Isaac, is 11 feet high, and lies E. by S. 14 miles from the Great Isaac, 18 miles from the E. end of the shoal ground, and about 3 miles from the edge of soundings; at 1½ miles to the eastward of it there is a small rock, awash at high water. The middle rock, named Middle Isaac, is only half a mile westward of the east rock, and 12 feet high. The other, called the Little Isaac, 2 miles farther in the same direction, is 8 feet high, and 3½ miles within the edge of the bank.

Little Isaacs.

The Brothers are two very similar small black rocks, 7 feet high. The East Brother lies WNW. 7 miles from the Little Isaac, and the other, named West Brother, is a little more than a mile farther to the WSW.

The Brothers.

Northeast, or Gull rock, equally small, and 12 feet high, lies W. by N. nearly 3½ miles from the West Brother, and NE. by E. 1½ miles from the Great Isaac.

Gull rock.

A mile and a half northward from the Gull rock, and nearly in a line with it and the E. end of the Great Isaac, there are said to be some rocks with only 12 feet of water upon them.

Great Isaac.

Great Isaac, at the NW. extreme of the Great Bahama bank, is a barren, narrow, honey-combed rock, about three-quarters of a mile long and about 40 feet high, and being foul, yet very steep-to, landing is sometimes difficult even in moderate weather. There are $4\frac{1}{2}$ fathoms water between it and the NE. rock, and the same depth between it and the Brothers, but, as before recommended, it will be better to pass outside all. The ground to the SW. of the Great Isaac is foul to the distance of half a mile.

Light.

On Great Isaac rock is a circular iron tower, painted with broad red and white bands, which exhibits at 158 feet above high water a *revolving* white light, attaining its greatest brilliancy every *half-minute*, and seen in clear weather from a distance of 16 miles.

Hen and Chick-
ens.

The Hen and Chickens form a group of barren, rocky islets, lying SW. 3 miles from the Great Isaac, and occupying a space of about a mile. The NE. rock, the largest, is 15 feet high; the others are only a few feet above water. A vessel may round their N. end at a quarter of a mile distance, and anchor on the bank in 4 fathoms; but the ground to the SW. is foul to the distance of three-quarters of a mile, where the depth is $2\frac{1}{2}$ fathoms.

The western edge of the Great Bahama bank, after rounding the Great Isaac at the distance of from 5 to 6 miles, takes a SSW. direction, and comes within about 5 miles of the Hen and Chickens; in passing this neighborhood in the night, do not come within the depth of 10 fathoms.

From the Hen and Chickens to the Moselle shoal the edge of the bank is clear, and vessels can run just within its edge in from 6 to 16 fathoms.

Moselle shoal.

Moselle shoal is SW. $\frac{1}{2}$ S. 16 miles from the Great Isaac, and NW. by N. $1\frac{1}{4}$ miles from the North rock. It is dangerous in the night-time, having only 4 feet of water on its S. end, but in the day-time it is very conspicuously marked by a large black buoy with staff and basket-work ball upon it.

Buoy.

This buoy lies on the N. end of the shoal, with North Rock

on with the NE. point of the North Bemini, bearing S. by E. $\frac{1}{2}$ E. and the western extreme of that island S. by W. $\frac{1}{2}$ W., in latitude $25^{\circ} 49' 45''$ N., longitude $79^{\circ} 17' 15''$ W.

To avoid this shoal the Great Isaac light-house should not be brought to bear to the northward of NE. $\frac{1}{4}$ N. till the shoal is passed, or at night till the Gun Cay light is opened W. of the Bemini islands bearing S. $\frac{1}{2}$ E.

The North and South Bemini are two irregularly shaped, sandy islands, covered with small wood to the height of about 40 feet, and occupy a space of nearly 6 miles N. and S. They are separated by a very narrow cut, which opens out to the eastward, and forms a secure harbor for wreckers drawing 8 feet. There is here a small settlement, and a resident magistrate; and vessels in distress may obtain water and supplies sufficient for the moment.

Bemini islands.

At the S. end of the island the edge of soundings is only three-quarters of a mile from the shore, but at the N. end it is nearly 3 miles distant; and anchorage will be found in 8 or 9 fathoms water, fine sand, about midway between the extremes, and a mile off shore; be careful, however, not to shoot too far in, and look out for a clear spot. A little more than a mile northward of the N. end of the islands there is a remarkable small black rock, 8 feet high, called North rock.

A shoal, locally known as the Henry bank, is stated to lie about NNW. half a mile from the S. point of South Bemini island, and quarter of a mile from the shore. It is believed to have a depth of 3 feet upon it with 3 fathoms on its in-shore side.

Henry bank.

From the Bemini islands a chain of small cays and rocks extends southward about 7 miles to Gun cay. Among them are Turtle rocks, 18 feet high, Picket rock, 12 feet high, Holm cay, 10 feet high, and several rocks awash. They all lie within three-quarters of a mile of the edge of the bank, and between them the tides run with great velocity.

Turtle rock.
Picket rock,
Holm cay.

Gun cay is a mile long NNW. and SSE., but very narrow. On the S. end is a light-house, of conical form, 70 feet high, having the lower part painted white, the upper part red, and showing a *red revolving* light, attaining its greatest brilliancy every minute and a half. The light is 80 feet above the sea, and is visible at a distance of 12 miles, ex-

Gun cay.

Light.

cept between the bearings of S. $\frac{1}{2}$ E. and S. by W. $\frac{1}{2}$ W., when it is intercepted by the Bemini islands.

When within 5 miles to the northward of the light, it should not be brought to the southward of SE., in order to avoid the low rocks between it and the Bemini islands, which sweep slightly outward, and, being so close to the edge of soundings, the lead will be of little use. There is temporary anchorage, with easterly winds, in 7 or 8 fathoms water, about three-quarters of a mile off shore, with the light-house bearing E. Wreckers find good shelter within the cay by passing round the S. end.

Cat cays.

Cat cays are two narrow woody islets, 40 feet high, lying from 1 to 2 miles within the edge of the bank, and extending about 4 miles SE. by S. of Gun cay, from which they are only separated by the small channel mentioned above. Round the S. point of the southern cay there is a good anchorage for vessels drawing under 12 feet, called Dollar harbor, where they will lie sheltered from all points but the S. The point is bold and steep-to, and the only danger to be avoided is the Rabbit rock, which is nearly awash, and lies WNW. a mile from the point. There are some small barren rocks, about 14 feet high, at three-quarters of a mile to the SW. of the point, and they must be left to the southward in going in. The small rocks, called the Factory cays, extend nearly $2\frac{1}{4}$ miles to the SE.

Some wells of good water will be found on the E. side of North Cat cay, about a quarter of a mile from its southern end.

Tides.

It is high water, full and change, on this part of the bank at 8^h 40^m.

The flood runs ENE.; the ebb, WNW.; springs rise $3\frac{1}{2}$ feet.

Brown's cay.

Brown's cay is a barren rock, 13 feet high, lying SSE. $\frac{1}{4}$ E. $12\frac{1}{2}$ miles from Gun Cay light-house, and $1\frac{1}{2}$ miles nearly northward of it there is a small sandy cay the same height. Off the S. end of Brown's cay is a small black rock, and between it and the cay there is a 9-foot channel on to the bank.

Beak cay.

Beak cay, lying $1\frac{1}{2}$ miles farther southward, is partially clothed with stunted bushes about 13 feet high. From

thence to the Riding rock, 7 miles distant, the space is filled with small rocks and coral ledges, and is quite impassable.

Riding rock is 14 feet high and scantily covered with brushwood. At $1\frac{1}{2}$ miles southward of it is the South Riding rock, 13 feet high, which has on it a small rough beacon of stones. At half a mile eastward of the South Riding rock is a small square islet, 12 feet high, called Castle rock.

Riding rock.

The Riding rocks and Orange cays have sometimes been mistaken for each other.

By bearing in mind that Orange cays are entirely barren and that the Riding rocks are covered with bushes, and, moreover, there is a beacon on the S. rock, they may be easily distinguished.

A vessel may anchor on the edge of the bank, which is here entirely clear, in from 6 to 9 fathoms, with the Riding rock bearing E. There is also an anchorage for small craft ESE. of Castle rock, but in approaching it from the eastward a vessel must cross a shallow sand-bank extending N. and S. To cross this bank in its deepest part, which has 15 feet of water, keep the South Riding rock open just to the southward of Castle rock, and anchor in $3\frac{1}{2}$ fathoms of water.

Orange cay, bearing S. $\frac{1}{4}$ E. about 17 miles from the Riding rocks, is the southernmost islet on this side of the Great Bahama bank. The ground between it and the Riding rocks is foul and almost choked up with a line of small rocky heads. In some places there are 3 and 4 fathoms water between them, but, except in a case of necessity, it would not be prudent to pass through. Orange cay is a barren rock about 13 feet high, lying about 2 miles within the edge of soundings. A ridge of low rocks runs off $1\frac{1}{2}$ miles to the northward of it; and at the same distance southward there is a single small black rock, from which a coral ledge, with only 12 feet water on it, extends off 2 miles in the same direction.

Orange cay.

From the Orange cays the SW. side of the Great Bahama trends S., and for the space of 20 miles, to the parallel of $24^{\circ} 35'$ there are very few shallow patches, although there are depths of 3 and 4 fathoms, at $1\frac{1}{2}$ miles within the edge.

At this point we will leave the bank and take up the description of the Salt Cay bank, finishing on page 119 *et seq.*

the description of that part of the Great Bahama bank which forms the N. side of the Old Bahama channel.

Salt Cay bank. Salt Cay bank is somewhat in the shape of a pear, with the thin end to the SE., and is skirted by islets on all sides but the S. It is 60 miles in length SE. and NW., and about 40 miles across at the broadest part, from cay Sal to the NE. point of soundings.

Between it and the coast of Florida to the NW. lies the Florida channel, on the eastern side lies the Santaren channel, and south of it is the Nicholas channel. To the SE. these two last channels unite to form the Old Bahama channel.

Double-headed Shot cays. The Doubled-headed Shot cays are on the northwestern edge of the bank. They are from 20 to 40 feet high, and lie so close to each other that there is scarcely a safe boat-channel between them, and consequently form a complete break-water to a good anchorage within them.

Water cay. Water cay, the easternmost and largest of them, is about 2 miles long and about half a mile broad. Near the centre, on the S. side, there is a natural well of excellent water, and opposite to it, on the same side of the island, a good landing-place.

From Water cay the chain trends SW. by W. $\frac{3}{4}$ W. 8 miles, where they form an elbow, and from thence sweep round to the SSW. $\frac{1}{2}$ W. $3\frac{1}{2}$ miles. The edge of soundings is about $3\frac{1}{2}$ miles from Water cay; thence it gradually approaches the islets, the South Elbow cay lying almost on the brink of the bank, and the Florida stream generally running with its full strength close alongside it. On the edge of the bank NW. of the Water cays, the Marion rock, reported in 1863, is marked on the chart.

Light. On the highest of the Double-headed Shot cays, named North Elbow, at the NW. edge of Salt Cay bank, stands a light-house 58 feet high, which exhibits a *fixed* white light at 96 feet above high water, visible all round at a distance of from 8 to 10 miles, except when it bears WSW., being then intercepted by Water cay.

From the Double-headed Shot cays the SW. side of Salt Cay bank trends to the southward and eastward for 12 miles to Salt cay, the only islet on this part of the bank. From the southernmost of the Double-headed Shot or Elbow cays foul

ground extends off $1\frac{1}{2}$ miles to the SSW. At 7 miles SSE. from the southernmost of the Elbow cays, and $4\frac{1}{2}$ miles from the NW. end of Salt cay, there is a rocky ledge awash, $1\frac{1}{4}$ miles in extent NW. and SE., close to the edge of soundings, and called by Admiral Kerhallet the Rompidas. The opening on either side of the ledge is quite free of danger, but in running on or off the bank it will be better to pass to the northward of it.

Rompidas.

Salt cay, so named from its possessing a valuable salt-pond, is in the shape of a triangle, each side being about $1\frac{1}{2}$ miles in length. The NE. side is formed by a narrow ridge of sand-hills about 30 feet high; the other parts are very low and sandy, and partially clothed with brushwood. During the season for raking the salt it is inhabited. There is temporary anchorage close under the W. side, in about 7 fathoms, on the edge of soundings, but it is not good. The tides set around it with great strength, and are sometimes influenced by the Florida stream running to the SE.

Salt cay.

The Lavanderas is a small rocky ledge, awash, lying 2 miles eastward of Salt cay. Between this and the Anguila islets there does not appear to be any danger along the southern limits of the bank; this part, however, has not been satisfactorily examined, and there is reason to believe many rocky heads may be found near the edge. The centre of the bank is foul in many places, and had better be avoided.

Lavanderas.

In beating across the bank a vessel should keep within 7 or 8 miles of the northern edge of the bank.

Anguila, the largest of the islets on Cay Sal bank, is about 8 miles in length SE. and NW., three-quarters of a mile in breadth, partially wooded, and from 40 to 50 feet high. It is cut through in several places, but there is no opening fit even for a boat; it may, therefore, be described as one island. It lies at the southeast extreme of the bank, and its northeast side is close to the edge of soundings. Good anchorage will be found in 6 or 7 fathoms water, off the southwest side, with the south end of the islet bearing E. by $\frac{3}{4}$ N., and the north extreme NNW. $\frac{1}{4}$ W. There are some wells of good water on it, but very difficult to find.

Anguila.

From Anguila the northeast side of the bank trends nearly straight NW. by N. about 40 miles. Between Anguila and the Dog rocks to the northwest are several clusters of

small low rocks, with deep water between, but most of the openings are dangerous.

Dog rocks.

Dog rocks, the northeasternmost islets on Cay Sal bank, are about 30 feet high, barren and rocky, and bending round to the NW. occupy a narrow space about 5 miles in length. They are separated near the centre by a narrow but deep navigable cut, and the eastern edge of soundings is about 2 miles outside them. The northeast point of the bank lies 5 miles to the NNW. of the northwest end of these islets, therefore vessels crossing over from the Great Bahama bank in the night by proper attention to the lead will escape danger; and it may be observed that accidents frequently happen here by neglecting this safeguard. The opening between these islets and the nearest rocks to the SE. is 7 miles wide, and although the soundings are irregular and the bottom dark and alarming, it appears to be quite clear, and is frequently used by vessels crossing inside the cays.

Muertos or
Deadmen's cays.

Muertos or Deadmen's cays lie W. $\frac{1}{4}$ S. 9 miles from the Dog rocks, and this opening is also quite free of danger, and may be safely used if necessary. The Muertos are a range of small detached rocks, from 10 to 15 feet high, extending 15 miles in a WSW. direction to the east end of Water cay. They lie about 3 miles within the edge of the bank, but great care must be taken in the night, as they are steep-to, and the soundings do not indicate the distance from them, and they are likewise not in sight of the Elbow Cay light. Several of the rocks are a considerable distance apart, but it would not be prudent to cross the ledges between them.

Tides.

It is high water, full and change, on Salt Cay bank about 9^h. Spring-tides rise from $2\frac{1}{2}$ to $3\frac{1}{2}$ feet. The direction and height of the tides are much influenced by the wind, but generally the flood tides run from all sides onto the bank and the ebb off. At the Double-headed Shot cays the tides have a gyratory course from north through east to south.

Directions.

It has been the almost universal custom for vessels proceeding westward from the Great Bahama bank to endeavor to strike soundings on the northeast end of Salt Cay bank or to make Elbow Cay light.

With light winds or in thick weather this course is still preferable, but with reasonably clear weather and a good breeze the distance will be much shortened by crossing over

at once to the Florida shore, making Alligator Reef light, and by bearings of this light with the ones on Sombrero and Sand cays running along inside the Gulf stream.

If the Salt Cay bank route be taken and the wind be scant from the westward vessels may run in on the bank on either side of the Dog rocks and pass off to the southward of the Elbow; or should the wind be light and tending to calm they may anchor within, to avoid being set to the northward, otherwise it will be better to run down outside, especially in the night, paying great attention to the lead.

Having passed Elbow Cay light, the course should be SW. $\frac{1}{4}$ W. until close over to the Cuba shore, to avoid the strength of the current. This course should lead direct toward the Pan of Matanzas, and within about 12 miles NW. of the light on cay Piedras, but this will depend upon the set of the current, which is very uncertain and sometimes strong into the Nicholas channel.

If bound to the southwest ports of the Southern States of America it will be advisable to run along the Cuba shore as far westward as Mariel, and then shape a NW. course, so as to pass at a proper distance westward of the Tortugas. Should the Cuba shore be left in the day-time, an occasional bearing of the high land will enable the mariner to estimate the strength of the stream and to regulate his course accordingly. He may depend upon finding the current right across, and probably with increased strength, as he advances to the northward.

The edge of the Great Bahama bank from the parallel of $24^{\circ} 35'$ N. inclines gradually to the eastward of S. and becomes foul for a distance of 42 miles. From this point the SW. edge of the bank trends to the SE. about 92 miles, to Ginger or Guinchos cay. It is clear nearly all the way, with only a few rocky heads, which may be easily seen. Ginger or Guinchos cay.

Guinchos cay is only about a cable in diameter and 6 feet high. It is formed of sand and dead bleached coral, and has a few stunted bushes upon it.

Anchorage may be found in 4 fathoms water in a small clear space about half a mile west of the cay.

From Guinchos the edge of the bank trends about SE. by E. 36 miles to Lobos cay, and is steep to all the way. About $13\frac{1}{2}$ miles SE. by E. $\frac{1}{2}$ E. from Guinchos cay and

about 1 mile inside the edge of the bank there is a 15-foot spot. Nine miles farther to the SE. there is a 17-foot spot, and from this spot to Lobos cay the edge is foul, with several narrow sand and weed ridges on which there are from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms.

Lobos cay.

Lobos cay is a small rocky islet about a cable in diameter, and only 6 feet above the sea. Anchorage will be found to leeward of it in 5 fathoms water, with the cay bearing SE. by E. $\frac{1}{2}$ E. from half a mile to a mile distant; but care must be taken to avoid the shallow sand-bores, which will be seen from aloft, about 2 miles to the NW. of it. A vessel may also run round the W. end of these ridges by the eye, and anchor anywhere within them.

Light.

A *fixed* white light is exhibited from a light-house on Lobos cay, at an elevation of 146 feet above high water, and in clear weather should be seen at a distance of 16 miles. The tower is circular, 150 feet high from base to vane, painted with broad *black* and white horizontal bands, and its base is surrounded by the keeper's dwelling.

Labanderas
reef.

Labanderas reef trends E. $\frac{1}{2}$ S. 5 miles, and is a narrow coral ledge quite wall-sided to the southward. The W. end lies SE. 5 miles from Lobos cay, and the ground between is foul.

At the E. end of Labanderas reef is a spot nearly dry, and from here the edge of the bank runs SE. 10 miles to Diamond point. (See page 70.)

This space is quite clear, and a vessel may run in on it and anchor anywhere in $5\frac{1}{2}$ or 6 fathoms of water with clear sandy bottom, as far as 4 miles within the edge of soundings.

Tides.

It is high water, at full and change, in the N. side of the Old Bahama channel at 7^h 40^m, and the rise and fall is 3 feet. The stream runs on and off the bank from half a mile to a mile an hour.

Remarks.

The Old Bahama channel has been considered as dangerous and difficult to navigate, but since the establishment of lights on various points on the N. coast of Cuba and that on Lobos cay it need not be so considered. As is the case everywhere in the vicinity of these banks, the navigator needs to exercise vigilance, caution, and judgment,

but with ordinary care this channel presents no special difficulties.

There is seldom any perceptible current in mid-channel; when there is any it appears to depend upon the wind.

In the winter season, from November to March, northers prevail, and sometimes the wind will veer round to this quarter after intervals of only a few days. A short time previous to the change the trade-wind will generally fall light, or a calm ensue for a few hours, and the land will be seen with unusual distinctness, but the barometer will scarcely give any warning. Dark clouds will be seen gradually rising to the WNW., and in a short time the wind will rush suddenly down from that direction with the strength of a double or close-reefed topsail breeze. It will probably blow steady at NW. for a day or two, and then draw gradually round to the N. and NE., accompanied by heavy squalls and rain, and wear itself out with the wind at E.

As the wind veers from the westward the barometer will rise, and the mariner may be sure of the wind never backing. Should the weather indicate this change before he has entered the channel it will be better for a sailing-vessel to remain outside, and maintain a good offing to the northward of the Maternillos light-house, which will be a good guide, until the wind veers to the eastward of N. Should the vessel have entered the narrows, it will be better at once to seek an anchorage on the Bahama bank, through either of the openings between Diamond point and Guinchos cay, or run back and take up a position as pointed out above. During the remaining portion of the year the wind prevails from the E. and SE., and a vessel will not be exposed to this interruption and risk, except in the case of a hurricane, which, however, seldom occurs in this locality.

CHAPTER IV.

THE SOUTH COAST OF CUBA.

Variation in 1876 :

Cape Maysi, 20° 40' E.	Cape Cruz, 3° 45' E.
Cape Pepe, (I. of Pines,) 50° 10' E.	Cape San Antonio, 5° 30' E.
Annual diminution from 1' to 2'.	

The island of Cuba was discovered by Columbus in 1492, and was first called Juana, in honor of the son of Ferdinand and Isabella, afterward Ferdinanda, then successively Santiago and Ave Maria. Its present name, Cuba, now universally used, is that given it by the native Indians. The shape of the island approaches a crescent, with the convexity to the northward. Its length is about 624 miles, with a very irregular breadth, varying from 27 to 90 miles.

The coast is very much indented, and the greater portion of the shores very foul and bordered with numerous cays and reefs. The harbors are numerous and excellent.

The coast, from cape Maysi to cape Cruz on the S. and to point Maternillos on the N., is bold and free of danger, as is the coast-line between Havana and Matanzas; the rest of the coast-line is foul and difficult of approach.

A range of mountains, highest at the eastern end, where an elevation of 7,000 feet is attained, extends through the island from E. to W.

The land along the shore is generally low and flat.

The climate is hot and dry during the greater part of the year. The warmest months are July and August, with a mean temperature of 82° to 84° Fahrenheit, and the coldest December and January, with a mean temperature of 68° to 70°. The seasons are spoken of as the rainy and the dry, but the line of demarcation cannot be exactly drawn. Rain often falls in torrents from July to September, and occasional showers fall for a month or two before and after these periods. Fevers, more or less malignant, prevail from May to November, and to a greater or less extent throughout the year. Of these, the yellow fever, to which all the sea-ports are subject, is the most fatal.

Hurricanes are less frequent than in the islands more to the eastward. In the neighborhood of Santiago de Cuba earthquakes of moderate force are sometimes felt.

In consequence of the seriously disturbed state of the island since 1868, no trustworthy statistics can be given. In 1867 the population amounted to 1,414,508, of whom 602,396 were blacks, only 365,000 being slaves.

No connected survey of the shores of Cuba has ever been made.

A large portion of the coast is very imperfectly known, and the navigator must bear in mind that the charts are only approximately correct. In 1875 the positions of Havana and Santiago de Cuba were established with very great care under the direction of the United States Hydrographic Office, but the latitudes and longitudes of many points on the island are known to be very seriously in error.

The eastern extremity of the island of Cuba is called cape Maysi or Maize, but the coast runs nearly N. and S. for a distance of 6 miles. When seen from the southward the cape has the appearance of a long low point. This part of the coast is low and covered with brush-wood.

Cape Maysi.

About 2 miles northward of the extreme E. point is a light-house, exhibiting a *fixed white* light, 128 feet above the sea-level. In clear weather the light is visible at a distance of 17 miles. The tower is round and white, having an octagonal base, with the keeper's dwelling adjoining, and stands about 55 yards from the sea.

Light.

One or two miles W. of cape Maysi the land begins to rise, and seen from the northward forms three steps, the upper one 1,850 feet high, gradually sloping upward to the eastern summit of the Cobre mountains. Strangers coming from the northward have mistaken the lower termination of the slope for cape Maysi, and keeping away too soon have fallen to leeward.

In approaching the eastern end of Cuba from the NE., some of the peaks of the Cobre mountains form good landmarks. The most remarkable, called El Yunque, or the Anvil, from its shape, is 1,850 feet high, and lies 27 miles from cape Maysi and 4 miles W. by S. from Puerto Baracoa, for which it forms a good guide. In rounding cape Maysi it should be remembered that the current frequently sets to

El Yunque
mountain.

the westward with considerable strength, especially during the winter months.

Pintado point. South of cape Maysi, at a distance of $2\frac{1}{2}$ miles from the light-house, is Pintado point; and from here the coast, composed of soboruco* cliffs of moderate height, trends to the SW. for $6\frac{1}{2}$ miles to point Negra, forming a salient bluff and then a cove.

A large cave, within which the sea breaks, lies nearly a mile S. of Pintado point.

Quemado point. A mile SW. of the cave is Quemado point, and at the same distance farther on is Bufeo point. Still farther to the SW., at a distance of 2 miles, is a beach of stones and sand, called the Playita de Ovando; the coast between it and Bufeo point being called the Cala de Ovando. Two miles and a quarter farther on is point Negra. A range of mountains, commencing near Pintado point, extends to the westward at a short distance inland and ends near point Negra.

At a cable and a half northward from this latter point is a spring of good water.

Pintado bank. From the coast between points Pintado and Quemado a triangular bank makes off, its outer point bearing E. $\frac{1}{4}$ S., from the former point distant 1 mile. Near the shore there are from 4 to 8 fathoms of water, with a bottom of fine white sand. The edge of the bank is steep-to, there being 18 to 28 fathoms at a cable from its edge, and a quarter of a mile farther off no bottom at 90 fathoms.

The coast from point Quemado to point Negra is steep-to and exposed to wind and sea.

Point Negra. Point Negra is a dark-colored, salient point, steep, barren, and easily distinguished. Half a mile off it there are 30 fathoms of water, with a gravelly bottom, and at the distance of a mile no bottom at 100 fathoms.

From Negra point the coast for 7 miles to Caleta point curves outward, with a general direction of WSW.

Sixty yards SW. of point Negra there is a precipice, with a small cove at its foot, called the Salto de la Punta Negra, where the sea breaks heavily.

This portion of the coast is composed of inaccessible

* White cliffs, composed of dead coral and hard sand.

soboruco cliffs, more or less covered with trees; the high land rising close to the shore.

Four and a half miles SW. by S. from point Negra is point Guanós, distinguishable by a cluster of palm-trees on it. Between these two points there are 28 fathoms of water over gravel and pebbles, at a distance of 5 or 6 cables from shore. Between points Guanós and Caleta there are 18 fathoms of water, with the same kind of bottom, at 3 to 6 cables off shore; while anywhere along this part of the coast, at a distance of $1\frac{1}{4}$ miles, there is no bottom at 90 fathoms.

Point Guanós.

From Point Caleta the soboruco cliffs extend nearly a mile to a beach called the Playa de Caleta, about 90 yards wide. A river flowing through a cut in the high land empties about the middle of the beach. Its mouth is generally choked up except during the rainy season and the water near the beach is salt. A little higher up, however, it will be found to be fresh and good.

Water.

From this beach the soboruco cliffs continue one-half a mile to a white sandy beach called Playa Blanca, $1\frac{1}{2}$ cables wide. In the middle of this beach is a rocky point, just eastward of which and near the shore is a spring of excellent water.

Half a mile from the Playa Blanca is the mouth of the Jauco river, emptying over a sandy beach and navigable for boats during the rainy season. Near the mouth of the river is a rocky point having a cavern in it called Cueva de Jauco.

Jauco river.

Immediately west of this point is a small beach called Caletón de la Cueva, then follows a soboruco cliff, a cable wide, and then the beach of Vaquero road, two-thirds of a mile long, with a sandy point in its centre. To the westward of this beach and separated from it by a small soboruco cliff is Largo beach, two-thirds of a mile long, ending in a rocky point which separates it from Largo Cove, 2 cables wide, with a sandy bottom. A quarter of a mile to the westward of Largo cove is Muertos beach, slightly curving outward and more than half a mile long.

Vaquero road.

Largo cove.

All along this part of the coast the mountain range is close to the shore. The three cuts or ravines of Caleta, Caletilla, and Jauco are very conspicuous. The land is thickly wooded, especially near the river Jauco.

A rocky ledge commences near Caleta beach and skirts the shore at an average distance of $1\frac{1}{2}$ cables as far west as Muertos beach. A little outside of it, or at about 400 yards from the shore, the depths are 9 or 10 fathoms; but off the point and cave of Jauco this depth is found at a third of a mile off. Between Caleta point and the Playa de la Caleta there is no bottom with 90 fathoms at 6 cables from the land, nor off the Punta de la Cueva de Jauco at three-quarters of a mile; elsewhere the depth is 90 fathoms at half a mile from the shore.

Anchorage.

The anchorage of Caleta is on a bank of fine white sand, with a few spots of rock and gravel in the indentation between Caleta point and the western extreme of the Playa Blanca. It is sheltered by high land from ESE. round by N. to W.

Although heavy squalls sometimes cause ships to drag here, this anchorage is very useful, as it is the only one in the vicinity.

In approaching this anchorage a vessel should steer in for the beach till within $\frac{1}{4}$ of a mile of the shore and let go the anchor in 10 fathoms of water.

Sunken rock.

This locality may be known by two small hills on the slope of the high mountain toward Caleta point. The edge of this bank is so steep that $\frac{1}{4}$ of a mile outside of a depth of 17 fathoms there is no bottom at 90 fathoms. With the wind from S. or SE. a vessel should not anchor here. A rocky head with less than 3 fathoms on it and 5 fathoms around it lies on the line between the beach and the point of Caleta at a distance of nearly 2 cables from the former.

Water.

Water may be obtained at low tide from a spring at the Playa Blanca. Wood also may be had.

From Muertos beach to Puerta point the coast runs about W. by S. for $8\frac{1}{4}$ miles.

From the western end of Muertos beach, soboruco cliffs, called La Costita, extend for $\frac{1}{4}$ of a mile, followed by the beach of the Rio Seco, rather more than $\frac{1}{2}$ a mile long. One and one-third cables from the western end of the beach is the mouth of the Rio Seco, only open during the rainy season, and during the remainder of the year closed by two bars, one of stone, and the other, farther in, of sand. The water is hardly fit to drink and is difficult to obtain by boats on

account of the bars. In case of necessity the best place to water will be to leeward of the mouth.

Near the ravine through which this river flows is a small table-land called El Yunque de Rio Seco. Yunque de Rio Seco.

West of the Rio Seco at the distance of $\frac{1}{2}$ a mile is the commencement of Llana beach, and between them are some soboruco cliffs and small sandy beaches.

Llana beach is $2\frac{1}{2}$ miles long with two small water-courses running through it, called la Cana and Llana, both of which are dry, except during the rainy season. Llana beach.

Llana point, composed of soboruco, projects a little at the western termination of the beach. The coast for $1\frac{3}{4}$ miles westward of the point is of cliffs, with one or two bays. In the first third of this space is Salto de Jójó point, which is high, salient, white, and seen at a great distance; the other two-thirds is high and steep. Jójó point, at $2\frac{1}{4}$ miles from Llana point, is of black rugged rock, of moderate height, and at its inner part is an isolated elevation like a sugar-loaf. Jójó bay lies between Jójó point on the E. and Tintorero point on the W. These two points are $\frac{2}{3}$ of a mile apart, and between them is an anchorage for small vessels. Llana point.

Jójó river empties into this bay, and from it and the ponds near its mouth good water may be procured.

Tintorero point is low and sandy; a mile to the westward of it is the mouth of the river Tacre, and half a mile farther on is Puerta point, flat and sandy. Tintorero point.

All along this part of the coast the high land rises abruptly from the shore with breaks or ravines abreast of the Rio Seco, Rio Tacre, and Puerta point. The mountains are covered with trees, with the exception of the Salta de Jójó, which is arid and barren.

The coast is bordered by a reef, broken in places, at an average distance of a cable from the shore.

At $\frac{1}{4}$ of a mile off shore the depth is from 7 to 13 fathoms, except off point Puerta, where at that distance there is a depth of more than 90 fathoms. Everywhere along this part of the coast at $\frac{3}{4}$ of a mile from the land there are more than 90 fathoms of water. Soundings.

Small vessels may anchor on the bank in Jójó bay, sheltered from E. by N. round by N. to W. by S., but it is not a place to be recommended, as the sea rolls in heavily. In Anchorage of Jójó.

standing in for it keep closer to Jojó point than to the other side, to avoid a sunken rock, and anchor just inside of the line joining the two points in 9 or 10 fathoms of water; sandy bottom about $1\frac{1}{2}$ cables off shore. Vessels anchoring farther out in 13 or 14 fathoms will be much more exposed to wind and sea.

Sombrero rock. The Sombrero rock, above water, lies about 60 yards off the eastern side of the beach.

As there are a few small houses and some cultivated ground in the neighborhood, a small amount of fresh provisions and water may be obtained.

This anchorage should not be approached with southerly or SE. winds.

Guayacanes point. The coast, from Puerta point to the beach of Imia, takes a westerly course for $3\frac{1}{4}$ miles with a slight outward curve, and is formed of alternate soboruco cliffs and small sandy beaches. About $1\frac{3}{4}$ miles W. of Puerta point is Guayacanes point, of moderate height, dark and prominent.

Imia beach. The beach of Imia is about $\frac{2}{3}$ of a mile long, and near its eastern end is the mouth of the river of the same name. To obtain water from the Imia river, the shore will be approached most easily WNW. of the small bay of Caoba, where it is clear of reefs. The mountains rise abruptly from the shore and are covered with trees. A broken reef skirts the shore at the distance of $\frac{3}{4}$ of a cable. The anchorage off Imia beach is only available with northerly winds. The only good position is about 2 cables off the eastern part of the beach in 9 or 10 fathoms of water, with a bottom of sand and weeds. Wood, water, and fresh provisions may be obtained here.

From Imia beach the coast is formed of rocky cliffs of moderate height, and trends to the westward for 4 miles to Yacabo point with an outward curve, in the middle of which is Imia point, steep and bluff.

Piedras Gordas point. Yacabo point is not very prominent, and from it the coast runs in a nearly straight line to Piedras Gordas point, so called on account of the large boulders upon it. To the westward of this point the shore forms a bay, at the head of which is a beach 3 cables long. The shore is clear except a rock near the eastern end of the beach, near which is a spring of

fresh water, easier of access and more sheltered than the stream farther to the westward.

The western limit of this bay is Guarda-*raya* point, and the next indentation in the coast to the westward is a small cove called the Guarda-*raya* de *Yacabo*, which is skirted by a flat reef and is almost unapproachable. The high land is here also very near the coast, with a break through which runs the river *Yacabo*, emptying into the bay of the same name.

In this bay there is anchorage entirely open to the southward. Vessels anchoring here should do so at the eastern end of the beach, to avoid the rocky heads off the western end.

Anchorage.

Fresh provisions may be obtained from the neighboring houses.

This coast is steep-to, there being a depth of 90 fathoms half a mile off shore, except between *Imia* and *Piedras Gordas* points, where that depth extends off 8 cables.

To the westward of the Guarda-*raya* de *Yacabo* the coast is rocky for about half a mile, followed by a beach $\frac{1}{4}$ of a mile long, with the mouth of the river *Ocampo* at its western end. Farther to the westward, at a distance of about 4 miles, is *Savana-la-Mar* point, a remarkable projection, steep and moderately high, with a rock on its summit, and lying 25 miles W. of *Caleta* point.

Savana-la-Mar
point.

Between *Savana-la-Mar* point and *Jaba* point, $1\frac{1}{2}$ miles to the eastward, the shore forms the bay and beach of *Savana-la-Mar*, where the river of the same name empties.

This bay affords temporary anchorage, entirely open, however, to the southward.

As good a berth as any will be found $\frac{1}{4}$ of a mile off the eastern part of the beach in 8 or 9 fathoms of water, with sandy bottom, and near a rocky, projecting point. Further to the westward the bottom is of gravel and rock.

Anchorage.

This locality may be easily known from a distance by the *Pan de Azucar*, a conical mountain 860 feet high, and visible from a distance of 30 miles. It lies about $\frac{3}{4}$ of a mile NNE. of the eastern end of *Savana-la-Mar* beach, and, seen from the westward, has the appearance of a sugar-loaf, but from the eastward looks like the roof of a house.

Supplies.

Water is abundant, and fresh provisions are easily obtained from the neighboring houses.

The edge of soundings here is steep-to and close to the shore, there being generally no bottom at 90 fathoms half a mile off the land.

The coast is skirted here and there with reefs at from 50 to 100 yards from the shore.

Baitiqueri.

From Savana-la-Mar point to the entrance of Puerto de Baitiqueri the coast for 4 miles is composed of alternate rocky cliffs and small sandy beaches. The port of Baitiqueri is sheltered from all winds and has good holding-ground, but from the extreme narrowness of a portion of the entrance, it can be only used by very small vessels. Its locality may be recognized by a break or separation in the mountains behind it. The windward and leeward points of entrance are nearly 2 cables apart, but reefs awash extend from each side of the entrance with the sea breaking on them. These reefs are 40 yards apart, but the deep channel of 21 feet between them is in two places only 14 yards wide. Inside the entrance the harbor is 6 cables long NNW. and SSE. and between 2 and 3 cables wide. The shores of the harbor are surrounded by high land. The depth of the water is from 11 to 18 feet, with muddy bottom. This is believed to be an excellent harbor for small vessels, but the only charts of it are said to be very incorrect.*

Rio Baitiqueri.

The shores of the harbor are thickly covered with mangrove-trees, interspersed with small sandy beaches which serve as landing places. The river Baitiqueri empties at the head of the harbor, but is obstructed by mangrove-trees. The water is good and may be obtained by going a short distance from the mouth by land. Wood can be obtained in abundance, as well as game and fish. Cattle, pigs, and chickens may be obtained from the neighboring settlement.

Winds.

The land-winds blow regularly all the year round at night, but do not reach far to seaward, and as the coast may be approached within 1 mile without danger from Sant-

* Mr. Middlemist, master R. N., states that the direction of the entrance channel is NNE. and not NNW. as shown in the chart and stated in the *Derrotero de las Antillas*, and that no part of the harbor is to the eastward of the entrance, the shores trending N. W. and S. E.

iago de Cuba to Guanos point, these land-winds are of much service to vessels endeavoring to get to the eastward.

A short distance off shore the flood-tide sets to the westward and the ebb-tide to the eastward. Farther out the current runs constantly to the westward during the months of July, August, and September with a velocity depending upon the strength of the winds producing it.

From Puerto de Baitiqueri the coast is rocky and trends to the SW. for 5 miles to Tortuguilla point, then W. for 3 miles to the mouth of the river Yateros, which empties into a cove with a sandy beach, then again to the SW. for 4 miles to Malaño point, salient and easily recognized from E. or W.

West of Malaño point, at a distance of three miles, is the entrance to Puerto Escondido, just to the eastward of which are two isolated hills.

Puerto Escondido, or Hidden harbor, is, as its name indicates, difficult to discover, but its locality may be known by the two hummocks to the eastward of the entrance. The entrance lies between two rocky points and is $1\frac{1}{2}$ cables long and about 200 yards wide. A reef makes off from each side of the entrance, leaving a clear channel 80 yards wide with from 4 to 6 fathoms of water. Beyond the entrance the harbor widens into an irregular shape, affording anchorage sheltered from all winds. There are several projecting mangrove points and many small shoals, but they are easily seen and avoided.

No trustworthy directions can be given for entering Puerto Escondido. The best way will be to buoy the edge of the weather reef with a boat and the harbor may then be entered without much difficulty.

No fresh water is to be had here, and, as there are no dwellings in the vicinity, there are no pilots to be had.

The coast from Puerto Escondido to Puerto Guantánamo or Cumberland harbor, a distance of $12\frac{1}{2}$ miles, is high and clear.

Puerto Guantánamo is a spacious and excellent harbor, easy of access for vessels of the largest draught. This port is about 11 miles in length N. and S. and may be said to form two ports, separated by numerous cays and projecting points. The inner harbor, called Joa bay, has, however,

Winds.

Malaño point.

Puerto Escondido.

Puerto Guantánamo or Cumberland harbor.

a depth of only 12 or 15 feet, and the channel leading to it, although deep, is very narrow.

The entrance to the harbor is open and easily perceived on being brought to bear N., and is $1\frac{1}{2}$ miles wide. Its eastern side is a straight rocky shore $1\frac{1}{2}$ miles long, and just inside of the northern end of this shore is a sand-spit called Pescador point, on which there are generally one or two huts.

There is a narrow rocky ledge, with 18 feet of water on it, about half a mile within the outer points of the entrance. It is about $1\frac{1}{2}$ cables long N. by W. and S. by E. The various accounts of its location do not agree, but its most projecting point is believed to be half a mile from the eastern shore and E. of the mouth of the river Guantánamo.

This river empties on the western side of the entrance about half a mile inside the outer point. From here a low sandy shore bends round to the NE., forming the N. side of the outer port. Near the centre of it there is a remarkable light-brown cliff. A shallow bank or reef borders this western and northern shore at the distance of about 2 cables. Water may be obtained from the Guantánamo river, but boats will have to go 11 or 12 miles up the river for it. It is also to be had from a small stream in the NW. part of the inner harbor. The stream, though only 16 or 18 feet wide, is deep enough for launches inside the bar, but on the bar at low water there are only two feet.

In approaching Port Guantánamo from the southward on about the meridian of $75^{\circ} 10'$ W., a remarkable conical mountain will be seen to the NNW., about 15 miles westward of the harbor. As the land is approached this mountain will assume a saddle shape, and a small isolated hill, with two small paps or hummocks near it, will be seen to the westward. The east side of the entrance is a round hilly bluff, barren but of a green color; the western point is low and woody. The coast is bold and steep-to and no soundings will be obtained till within the points. The eastern point can be rounded at 2 cables' distance, and when abreast of it steer N. by W. for the brown bluff above mentioned on the northern shore. When Pescador point is open haul up NNE. and when it bears E. by S. haul up NE. or NE. by

E. and anchor as convenient, with Pescador point bearing from S. by E. to SSE.

The eastern shore is quite clear and a vessel may stand farther in if desired. It will be well for a sailing-vessel to wait for the sea-breeze to enter and for the land-breeze to go out. Should it be necessary to beat in or out, do not stand inside the depth of 6 fathoms, and in standing to the eastward do not bring the *brown* cliff to the westward of NW. by N. $\frac{1}{2}$ N., to avoid the Pescador or Fisherman ledge.

Fresh provisions, fruits, and vegetables can generally be obtained here.

The coast from Guantánamo to Berracos point, a distance of 20 miles, takes a westerly direction, and is clear of danger and steep-to. Berracos point may be recognized by a remarkable conical hill upon it. From this point the shore trends to the NW. for 5 miles, forming the bay of cape Bajo, then, resuming its westerly direction, to the mouth of the Juragua river, 8 miles of Berracos point.

To leeward of the bay of cape Bajo are three small sandy bays, separated from each other by high steep bluffs, called los Altares, or the Altars, from the remarkable flattened summit of the eastern one. Back of these small hills are the lofty mountains of the Sierra Maestre.

From the river Juragua the coast continues its westerly direction to the entrance of the harbor of Santiago de Cuba, and is entirely free of dangers. To the eastward of Santiago de Cuba are the mouths of the rivers Sardinero and Aguadores, and near them are some small houses on the shore.

At 7 or 8 miles E. of the entrance of Santiago de Cuba a vessel may anchor in 17 fathoms of water, on the edge of the bank abreast of a valley or ravine and about $1\frac{1}{2}$ miles off shore. With the Morro Castle bearing from NW. to N. by E., distant 1 mile, there are 4 fathoms rocky bottom, and there is the same depth 2 cables off shore.

The port of Santiago de Cuba will admit vessels of the largest draught, and is entirely sheltered from all winds. Its locality is indicated from a distance by a remarkable valley, separating the eastern from the western spur of the Cobre mountains. This latter range rises a few miles west-

ward of the harbor, at the distance of about 11 miles, attaining a height of 3,340 feet, and extending along the coast as far as cape Cruz. The lofty mountain of Turquino, 8,520 feet high, is 56 miles W. of Santiago, and in clear weather may be seen from the N. coast of Jamaica.

On the eastern side of the entrance is the Morro Castle, a rather large fortification, standing on the western extremity of a flat ridge about 200 feet high, 9 miles in length E. and W.

A short distance N. of the Morro, but on much lower ground, is the castle of Estrella. Between it and the Morro there is a small inlet, with a fort at the head of it.

The entrance to the harbor lies nearly N. and S., and is about a cable wide. After passing Smith cay the channel widens, and, although the course is crooked, the sea-breeze is generally a fair wind up to the city.

Pilots board ship outside the Morro, and, by the regulations of the port, all merchant-vessels are required to take one.

Steam tugs are in readiness to tow sailing-vessels in or out of the port, if required.

The city is quite large and is the oldest in the island, and is built on the NE. side of the harbor.

Coal and supplies of all kinds can be obtained here.

A telegraph-cable connects Santiago de Cuba with Jamaica and the Windward islands, and another laid along the S. coast affords communication via Havana with the United States and Europe.

From a light-house, 20 feet high, built of iron and painted white, standing on the high land 100 yards E. of the Morro castle, a *white* light is shown, *revolving every two minutes*. The light is 220 feet above the sea, and in clear weather may be seen at a distance of 15 miles. In January, 1876, it was in bad order and could not be depended on.

If bound to Santiago de Cuba from the eastward give the shore a berth of $1\frac{1}{2}$ or 2 miles, to avoid the foul ground off the Morro, till the castle of Estrella comes open of the Morro. As soon as it bears NE. by N. stand in for it. Do not bring it to the eastward of this bearing, in order to avoid the Diamante bank which borders the western side of the entrance, and for the same reason the Morro point should

be kept close aboard. The Diamante de Afuera shoal, just to the westward of the entrance, is probably laid down a little too far off shore. The pilots state that the sea in heavy weather breaks upon it. Stand close along the eastern shore till the Estrella castle is passed, and then keep in mid-channel between the shore and Smith cay, on the S. end of which is a pilot-station. When off the N. end of Smith cay a wooden beacon, painted white, with a square head, will be seen standing in 13 feet of water, on the western extreme of a flat ledge running off Punta Gorda. If this beacon should be absent, the N. angle of the Estrella fort, kept just open of the E. side of Smith cay till the city comes open, will clear the ledge. After rounding this point a red beacon of the same kind standing in 8 feet of water on the Colorado shoal will be seen apparently in mid-channel. This must be left to the westward. The Punta Gorda cliff S. of it is clear of danger.

Punta Gorda
ledge.

Colorado shoal.

Then steer along the eastern shore and pass to the southward and eastward of Ratones cay, on which there is a magazine. After passing Ratones cay a white beacon similar to the one on Punta Gorda shoal will be seen standing on Compadre shoal, in 13 feet of water, and must be left to the eastward. The Compadre is the outer of two small shoals, on the inner of which is a dry rock.

Ratones cay.

Compadre
shoal.

After passing these shoals a vessel may haul up for the city and anchor as convenient. The depth gradually decreases toward the northern part of the harbor.

A sailing vessel may enter the port as far as the outer anchorage with the wind from ESE., but to proceed to the city she must have the wind as far to the southward as SE. by E. in order to weather the Colorado shoal. To leave the port, as she will have to haul up as high as SE. by E. between Smith cay and Gaspar point, the wind should be as far to the northward as NE. With very light winds vessels should not attempt to enter or leave the port under sail. In winter, when NE. winds prevail, some days may elapse when vessels cannot enter under sail, but there is generally during the day-time a breeze from SE.

During the rainy season the current in the channel at the entrance is very strong.

Within the port squalls are frequent between May and October, bringing much rain and wind, especially if they come from the NE.; they appear to arise in a great measure from local circumstances, inasmuch as off the coast, and even in the channel, they are less frequent. The land-winds are constant during the night, weak from May until October, but fresh in the dry months and northerly winds; sometimes they begin to blow at 9 p. m., at other times they do not commence until early morning, yet they almost always last until a little before the sea-breeze sets in between 9 and 10 a. m.; between the two winds there is an interval of calm.

Sailing-vessels should avoid running into the calm near the Morro, especially if there be much sea outside. From May till October storms from the SE. take place all along the coast, when the weather is so thick and dirty as to completely obscure it; during which it is dangerous to endeavor to make the port as it is then difficult to recognize, and the sea is so heavy at the entrance as occasionally to close it. It is high water, full and change, at 8^h 30^m, and the tide rises and falls 2 feet.

From Santiago de Cuba to cape Cruz, a distance of 110 miles, the coast takes a westerly direction, and is steep-to, bold, and thickly wooded. The peak of Turquino has been already mentioned; 38 miles farther to the westward is a remarkable mountain called the Ojo del Toro, 16 miles E. of cape Cruz. It is 5,264 feet high, and, when seen from the WSW., forms two or three hummocks.

Thence the range decreases in height, falling by steps to the cape, which is low and covered with trees, and near the end of the sandy point there are some small huts and a flag-staff.

At 4 miles eastward of the cape the shore is composed of scarfed cliffs about 90 feet high, having horizontal strata-but near the cape they are copper-colored, with perpen- dicular strata.

Soundings appear to extend all along this coast, a short distance from shore, and there are several boat-harbors and small, partially sheltered bights, where very small coasters may find temporary anchorage. In good weather a vessel may anchor in 6 or 7 fathoms of water abreast of the beach at the foot of mount Turquino.

El Portillo, 24 miles E. of cape Cruz, is a harbor said to be accessible to vessels of large size. El Portillo.

Good temporary anchorage will be found here for vessels of the heaviest draught. The locality may be known by three perpendicular white cliffs on the western side of the harbor, while the land on the eastern side is low and marshy. Both points of entrance are foul to a short distance, but the reefs which skirt them are steep-to, and the sea breaks upon them. The interior of the harbor is obstructed by sand-banks, which are generally marked out by stakes.

In mid-channel there is a depth of 7 fathoms. A good berth will be found, with the eastern point bearing ESE., $\frac{1}{4}$ of a mile distant, in $5\frac{1}{2}$ or 6 fathoms of water.

Good water may be obtained at El Portillo. To the westward of this harbor there are from 6 to 12 fathoms at from 2 to 4 miles off shore.

The depths are irregular, often changing suddenly from 4 to 7 fathoms; but the water is clear, and there is no difficulty in selecting a sandy spot for anchoring.

About 12 miles westward from Portillo and the same distance E. of cape Cruz light-house there is said to be an excellent reef harbor for vessels of any size, with no dangers that are not apparent and easily avoided. It is at the foot of the Ojo del Toro mountain, and, although no precise directions can be given for it, the knowledge of its existence might, in emergency, be useful.

A *fixed white* light, varied by red flashes at intervals of three minutes, is exhibited from cape Cruz. The tower is built of hewn stone 107 feet high, showing the light 115 feet above the sea-level. The keeper's dwelling is a large rectangular building painted light yellow. The light should be seen in good weather at a distance of 18 miles. Light.

A reef, awash, and on which the sea breaks heavily, commences $1\frac{3}{4}$ miles E. of the cape and extending to the westward terminates 1 mile SW. of it. Several $2\frac{1}{2}$ and 3 fathom patches lie W. and NW. of the cape about 2 miles off shore. There are often a number of fishing-stakes on the reef, and its western extremity is frequently marked by a staff with a bunch of palm-leaves upon it placed there by the pilots. Cape Cruz reef.

To the westward of the reef a bank with from 4 to 7 fathoms of water on it extends 3 miles farther W.

Good anchorage will be found to the northward of the reef in 4 fathoms of water with sandy bottom, with cape Cruz bearing SE. $\frac{1}{2}$ E., mount Ojo del Toro E. by N., and the extremity of the reef S. by E.

In coming from the eastward do not bring Ingles point, 8 miles E. of cape Cruz, to the eastward of E. by N. till Colorado point, the second point N. of the cape and of a dark green color, comes open of Cacimba point, to avoid the reef.

Cacimba point is the first point N. of the cape, and is sandy.

Pilots reside at cape Cruz, but as they are not numerous it frequently happens that a vessel has to wait till one arrives in an outward-bound ship. In this case good anchorage will be found as above stated.

Navigators must constantly bear in mind that even the best charts give but an incorrect idea of the chain of cays, reefs, and shoals which extend 150 miles to the NW. from cape Cruz. No good survey of this part of the coast has ever been made and no materials exist for describing it correctly. A vast number of the cays are precisely alike, and the channels, when marked at all, are only marked by small bushes placed by the pilots, and which the first rough weather will wash away. There are, doubtless, deep navigable channels between the shoals, but they are only known to the pilots, who are very reticent and unwilling to communicate any information regarding them.

Manzanillo.

From cape Cruz the coast takes a NE. direction for 45 miles to the anchorage of Manzanillo, the seaport of Bayamo, a large town 18 miles inland.

The bay of Manzanillo lies between the mouth of the river Yara on the N. and Caimanera point on the S., 3 miles apart. The shores of the bay are low and covered with mangrove-trees, and the water is shallow, caused by the large quantities of mud and sand deposited from the rivers Yara, Buey, and Cauto during the floods.

NW. by N. of the fort at the SW. extreme of the town, at a distance of about 6 cables, there are about 16 feet of water.

A large quantity of sediment, which helps to fill up the bay, is brought down by the river Gua, the mouth of which with the point of the same name lie 9 miles WSW. of the town.

North-northwest of this point are three cays of the same name, and between them and Gua point there is a channel over a mud flat with a depth of 11 feet. Gua cays.

The Manzanillo cays are a group of low islets, most of them covered with mangrove-trees, extending over a space of 6 miles from WSW. of the town to NW. of it at an average distance of 5 miles, and affording a sheltered anchorage for large vessels, with deep water. In the middle of them there is a passage about 85 yards wide, with a depth of 7 to 11 fathoms. Manzanillo cays.

A short distance SW. of these cays is a small islet, called Perla cay, which forms with the Gua cays a channel about 200 yards wide, with 7 fathoms of water; muddy bottom. Perla cay.

The great chain of shoals, cays, and reefs which skirt this part of the coast commences about 15 miles NE. of cape Cruz, with the great bank of Buena Esperanza, and extends to the westward as far as Maria Aguila point, near Trinidad de Cuba.

The usual approach to Manzanillo is by the Balandras channel, a narrow passage carrying from 17 to 22 feet of water between the small cays off the SE. part of the Buena Esperanza bank and the cays close to the Cuba shore.

Proceeding to the NE. from the Balandras channel, in 7 to 8 fathoms of water, the Manzanillo and Gua cays will be seen, and the passage between them should be steered for.

There is also a passage farther to the westward, leading to the anchorage of Manzanillo, called the Barcas channel, but it is not well known except to the pilots. Barcas channel.

To the northward of Manzanillo, at a distance of 12 miles, is the mouth of the river Cauto, one of the deepest in Cuba, and navigable for a distance of 60 miles, although the bar can only be crossed at high water by boats.

The channels leading to Manzanillo, although not very well known, may be navigated by vessels drawing not more than 15 feet by carefully following these directions.

From the end of the reef off cape Cruz the course is NNW., passing within $\frac{3}{4}$ of a mile of Cacimba point, but

taking care not to go within a depth of $3\frac{1}{2}$ fathoms to avoid a shoal making off from it. When abreast of Cacimba point, haul up N. $\frac{1}{2}$ E., passing about 3 miles off Colorados point, with a depth of water of $4\frac{1}{2}$ to 6 fathoms.

From Colorados point a reef runs off, its extremity being generally marked by a stake.

Give this stake a berth of 2 cables, and when abreast of it haul up NE. by E. for Nigüero point, the extreme of the land now visible, and on the port bow will be seen the Huevos cays, two in number, and 7 miles distant, bearing NE. by N. The next stake, which is 1 mile NE. of the first, should be left on the port hand, and from it steer E. by N. $\frac{1}{2}$ N., having a depth of about 11 fathoms.

Between points Colorados and Nigüero will be seen Limones point, 6 miles NE. of the former, with a small cay off it. Steering on E. by N. $\frac{1}{2}$ N., as directed, the course lies between a shoal to seaward and some sunken rocks in shore, and after running about $1\frac{1}{2}$ miles two pairs of stakes will be seen. The channel lies between them, the least water being 5 fathoms. Each beacon is composed of two stakes, with a board nailed across the head of the one nearest the channel.

A stake will be seen planted in 11 feet of water on the extreme of the bank extending from point Limones, and $\frac{1}{2}$ mile farther off shore will be seen another stake on the Limones shoal. The channel with 8 to 9 fathoms of water lies between them. Each one of these beacons is a cross-headed stake. From here the course is NNE. toward the most salient of the Balandras cays, which may be seen open of the Huevos cays.

The next narrow place is between the extremity of the reef extending from the Huevos cays, marked by a stake about 1 mile off the cays and a shoal about $\frac{1}{2}$ mile farther out, marked by a pair of stakes. In mid-channel here the depth of water is 9 fathoms, with the Huevos cays bearing ESE. and the most projecting of the Balandras cays N. by E. $\frac{1}{2}$ E. From here through the Balandras channel the course is NNE., the water gradually shoaling to $2\frac{3}{4}$ fathoms between the Balandras cays and the mainland. There are two stakes in this channel, both of which are to be left on the starboard hand. After passing these stakes a NE.

course will lead up to the Manzanillo cays, and from here the channel between the bank of Buena Esperanza and the main-land is perfectly clear and 6 miles wide, with a depth of 7 to 10 fathoms. The W. I. Pilot states that in 1868 H. M. S. Niobe was piloted through a channel westward of the Balandras, called the Balamina, which if properly marked would be navigable for the largest class ships.

Pass to the westward of the Gua cays and as soon as the vessels at anchor in Manzanillo bay bear ENE. steer toward them, passing between Gua and Perla cays at 1 mile distant from each and carrying a depth of between 4 and 5 fathoms, which gradually decreases to 2 fathoms at $\frac{3}{4}$ of a mile from the town, off the northern part of which is the best anchorage with a bottom of soft mud.

It is high water, full and change, at Manzanillo at 10^h 40^m. The tide rises and falls 3 or 4 feet. The greatest rise of the tide is in the months of September and October with the winds from S. or SW. Tides.

The bank of soundings lying between cape Cruz and the eastern end of the Doce Leguos cays, 55 miles to the NW., is clear of danger, and vessels may stand in to 7 fathoms anywhere except from about 8 miles NNW. of the cape to the cay on the southern extremity of the bank of Buena Esperanza; within these limits it is not safe for vessels to go within the depth of 10 fathoms, as the ground is intersected with numerous rocky ridges, some of them nearly awash.

There are very material errors in all the published charts of Cuba, and the positions of but few of the points on the coasts can be entirely depended upon. The latitudes of the portion of the coast in the vicinity of Trinidad as laid down on the latest English charts are, it is said, several miles in error, and the longitudes are generally still less trustworthy.

From the Balandras channel the edge of the Buena Esperanza bank trends to the westward for 10 miles to a small cay lying about N. by W. 17 miles from cape Cruz. Thence it takes a northerly direction for 18 miles, then bending to the WNW. 15 miles to the Cuatro Reales channel, the eastern passage to Santa Cruz, forming also the Barcos and Pitajaya channels. The entrance bears NW. by N. from cape Cruz, the chart erroneously placing it N. by W. $\frac{3}{4}$ W. from the cape.

Santa Cruz.

The anchorage of Santa Cruz is accessible only to vessels of light draught. Vessels bound here should from the western edge of the reef off cape Cruz steer a N. by W. course, which will lead up to a group of eleven small cays extending E. and W., the two most westerly of which are separated

Cuatro Reales
channel.

Ceiba cay.

by a channel 6 miles wide, called Cuatro Reales channel.

The eastern cay is called Ceiba, and is distinguished by some round-topped trees in its centre.

Immediately to windward of Ceiba cay is a remarkable sandy cay, and near it is another where the pilots reside.

The least depth of water in the Cuatro Reales channel is 16 feet, and will be found about 2 miles W. of Ceiba cay. The channel leading to Santa Cruz is narrow and crooked, but the water is so clear and the shoals so steep-to that the vessel may be easily guided by the eye.

Media Luna
cays.

After passing Ceiba cay the course is N. by W., leaving on the starboard hand the Media Luna cay and on the port

Mordazo cays.

hand the cluster called the Mordazo cays, and on arriving abreast of the N. point of these latter cays, steer to the westward, passing between the Mordazo cays and the Carenero cays, near the coast, and carrying a depth of $3\frac{1}{2}$ to $5\frac{1}{2}$ fathoms of water over variable bottom.

Carenero cays.

The Carenero cays, two in number, lie E. of the entrance to the anchorage, and to the westward are two others, called Pinipiniche. From the anchorage the houses of the town bear from NE. to NW.

Eastern chan-
nel.

The eastern channel lies between the easternmost of the Doce Leguos cays and an extensive bank, on the western

Uvero cays.

part of which are the Uvero cays.

To enter this channel from outside steer N., giving a berth of 1 mile to the reef which forms the eastern side of the channel. When abreast of the white sand-bank, haul up NNE. and pass through a group of three cays, leaving two of them to the eastward, and carrying a depth of 11 to 12 fathoms of water. After passing these three cays steer toward the easternmost of the Pilon, a group of four islets extending WNW. and ESE. When within 1 mile of this latter cay the Mate channel will be seen, to enter which bring the N. point of the easternmost Pilon cay to bear NW. $\frac{3}{4}$ W. and keep it so, steering SE. $\frac{3}{4}$ E.

Pilon cays.

A better, because easier, course is to pass between the eastern Pilon cay and the Mate cays, and, rounding the latter to the northward, pass between them and the coast of Cuba. In both of these channels the depth is 16 feet.

To the eastward of the Mate cays keep the coast aboard, carrying about $5\frac{1}{2}$ fathoms of water till about $\frac{1}{2}$ a mile to the southward of the Pinipiniche cays, when the town will be seen and anchorage will be found, as before stated.

Outside these cays the soundings are regular, and vary from 8 to 20 fathoms. From abreast of cape Cruz the edge of soundings trends to the N. till within 1 mile of Ceiba cay. From here it rapidly approaches the cays, and 20 miles farther to the westward is within a very short distance of the eastern extremity of the Doce Leguas cays.

On the edge of the bank the bottom is generally rocky, but inside of a depth of 10 fathoms vessels may anchor temporarily on sandy bottom.

It is high water at full and change at Santa Cruz at 12^h. Tides. The tides rise and fall about 4 feet, but are greatly affected by the winds.

The Doce Leguas cays form a chain of low islets extending WNW. and ESE., generally covered with brushwood and surrounded by sand-banks. As they are steep-to, the lead will give no warning of their proximity, and a good berth should be given them during the night-time.

The easternmost of these cays lies NW. 56 miles from cape Cruz, and is 15 miles from the nearest point of the Cuban shore, from which the westernmost of the cays is at the same distance, while the centre of the cays lies 40 miles from the land.

The white sand-bank lying between this chain of cays and the shore is studded with numerous small islets and reefs with deep channels between them.

There are various channels through these cays for vessels drawing not more than 15 feet of water, but a pilot should be taken. Pilots can be obtained at cape Cruz, at the entrance to the Cuatro Reales channel, or from one of the numerous fishing-vessels from the Grand Caiman which frequent this vicinity.

The principal passages are the eastern channel just described, the Caballones, 40 miles to leeward, and the Boca

Grande, 22 miles farther to the westward. All these are wide and easily recognized.

The extensive bank inside the cays has generally depths of 10 fathoms on the western side and 13 fathoms on the eastern, over a very soft, white, marly bottom, the mud from which discolours the water and adds to the dangers of the navigation. The whole space is covered with groups of low cays, and reefs, very inaccurately laid down on all charts, and their names are in much confusion. There are many excellent anchorages among these cays where vessels could ride securely in the heaviest weather. The assistance of a pilot would be necessary to reach them.

One of the best of these anchorages is in the vicinity of a group of cays called the Palomas or Brigands, lying 15 miles N. by W. from the Boca de Caballones. The outside anchorage is in a large bay formed by a semi-circular chain of reefs and cays, and which may be entered from the N. or W. without danger. This anchorage is well sheltered from SW. round by S. to NNE.

Palomas or
Brigand Cay an-
chorage.

A good berth will be found $\frac{3}{4}$ of a mile N. by W. $\frac{1}{4}$ W. from a small sandy cay on the reef which joins the most western of the cays with the rest of the group. Here there are 7 fathoms of water with good holding-ground. If, however, a more sheltered anchorage is desired it will be found in the lagoon inside, having an entrance open to the eastward through which a depth of 3 fathoms may be carried. This inner anchorage is completely surrounded by reefs and cays, and lies in latitude $21^{\circ} 6' N.$, longitude $78^{\circ} 56' W.$ This position, however, is about 5 miles NNE. of the position assigned to the Palomas cays on the Admiralty chart of 1865; and as the charts of this region are not at all trustworthy, the cays surrounding this anchorage may or may not be the Palomas group.

In many portions of this bank there are shoals of branch coral rising to the surface of the water from a depth of from 5 to 12 fathoms. By sending a boat ahead to sound a steamer may be navigated among them, but not without risk. From a point 5 miles N. of the Boca Grande to within 10 miles of the Cuban coast these dangers are very thick. The channel E. of Burgado cay is so full of these coral shoals as not to be fit for use. In former times the vicinity

of the Boca Grande and Boca Caballones was much frequented by slavers.

The tides run off and on this bank with great force.

Tides.
Cay Breton.

Cay Breton, the most western of the Doce Leguas chain, should be rounded carefully on account of a reef extending from it $3\frac{1}{2}$ miles to the SW. This reef is steep-to, and the sea generally breaks on it. Off the western end of the cay there is anchorage in $4\frac{1}{2}$ fathoms, with the NW. end of the cay bearing NE. $\frac{1}{4}$ E., and the SE. end E. by S. In standing in to a less depth than 4 fathoms, keep a good look out for rocky heads.

Sailing-vessels generally have to beat up to this anchorage, and in this case, after rounding the western end of the reef the NW. end of the cay should not be brought to the southward of ESE., nor on the other tack should the same point be brought to the northward of NE. by E. This anchorage is sheltered from N. by E. to SW.

As the reef already mentioned off the western end of cay Breton does not always break, vessels are apt to haul too close round it, and consequently this reef is seldom without a wreck upon it.

The reef begins again $3\frac{1}{2}$ miles NW. of cay Breton, and in the opening is the entrance to a narrow crooked channel, leading on to the interior of the bank, but it is only well known to the Cayman fishermen, who navigate through it by the eye.

The reef beginning $3\frac{1}{2}$ miles NW. of cay Breton takes a NNW. direction for 22 miles, ending $\frac{1}{2}$ a mile to the northward of Zarza de Fuera cay, a low, sandy islet covered with trees, distant about 8 miles from the nearest point of the Cuban shore, and about 3 miles eastward of the NW. portion of the reef.

Zarza de Fuera
cay.

The reef is steep-to on all sides, having 10 fathoms of water close to its edge. There are no cays or islets upon it, except here and there a patch of dry sand.

The positions of the edge of the reef, as laid down on the charts, are not at all to be depended upon. The Médanos de Manati cays are also inaccurately laid down, their position being about latitude $21^{\circ} 27' N.$, longitude $79^{\circ} 16' W.$ The neighboring coast of Cuba is also laid down 7 miles too far to the S. as far E. as Pasabanao point. The channel sep-

arating the coast of Cuba from Zarza de Fuera and the Médanos de Manati cays is clear, and affords excellent anchorage.

A vessel should pass 3 miles westward of Zarza de Fuera cay, and when it bears E., if wishing to enter upon the bank, the vessel may be hauled up NE., the edge of the bank being quite clear for 12 miles, or within 2 miles of Machos de Fuera cay. After striking soundings the water will shoal almost immediately to 5 fathoms, and then deepen to 10 and 12 fathoms, with occasional patches of 5 fathoms as the vessel advances along the channel.

This part of the coast affords good shelter and holding ground, and is without danger as long as the beach is in sight. Abreast of the Doce Leguas cays the coast is low and marshy, producing quantities of tobacco, honey, wax, and mahogany, exported in vessels of not more than 15 feet draught from Santa Cruz and the river Jatibonico, the mouth of which lies 30 miles to northward of the Boca Grande.

Boca Grande.

The Boca Grande is the most convenient channel of approach to the river Jatibonico and is the most western of the channels by way of the Doce Leguas cays. It is 4 miles wide and its depth is $2\frac{1}{4}$ fathoms, except within $\frac{1}{2}$ a mile of either shore. Cayo Grande, which forms the eastern side of the channel, should be given a berth of 2 miles on account of a reef extending for $1\frac{1}{2}$ miles to the southward off its western shore. This reef can be easily seen.

Having entered between the cays the course is NE. by N. $\frac{1}{2}$ N., which leads to windward of Rabiorecado and Burgado cays, the former lying 7 miles N. of the western part of Cayo Grande, and the latter 4 miles still further N. The depth in the channel ranges from $10\frac{1}{2}$ to 13 fathoms. The course lies to the westward of numerous coral heads, steep-to and easily seen from aloft. After passing Burgado cay the course is N. $\frac{1}{2}$ W. to the mouth of the Jatibonico river, where mahogany and cedar timber is shipped in large quantities.

Jatibonico
river.

When the water is smooth the Boca Grande is a safe passage for vessels of 15 feet draught. The best track is west of the middle of the channel.

There are two anchorages at the entrance to the Boca Grande, neither of them very good. The first one, with a depth of 4 to 7 fathoms of water, is in a bight formed by the

reef in the eastern part of the channel and lies 1 mile S. by W. $\frac{1}{4}$ W. from the western end of Cayo Grande.

Here a vessel is better sheltered from the usual easterly winds than in any other part of the entrance, and the tide is not felt so strongly, but with the wind from the southward or westward it would not be a safe berth, and, moreover, a sailing-vessel with these winds and a flood-tide could not leave.

The other anchorage, with a depth of $2\frac{1}{2}$ fathoms, is sheltered from W. and NW. winds. It lies in the western part of the channel, about ENE. from the S. end of the Cinco Balas cays, and S. $\frac{1}{2}$ W. from their NE. point. This anchorage is exposed to the entire force of the NE. wind and the sea, and a vessel lying here with these winds will have a dangerous reef right astern.

The Boca de Caballones lies 20 miles ESE. of the Boca Grande. It is the easternmost of the channels through the Doce Leguas cays, for vessels larger than boats. It is easily recognized, being 2 miles wide, while none of the openings to the eastward have a greater width than $\frac{1}{2}$ a mile. At a distance of 1 mile to the westward of this channel is a cocoanut tree. Most of the trees on these cays are a sort of dwarf palm; the cocoanut is seldom seen. There are only $2\frac{1}{4}$ fathoms of water in this channel, and the same depth is found to the SW. of the entrance, from each side of which reefs extend, narrowing the channel to 2 cables in width.

Boca de Cabal-
lones.

No good marks can be given, and the eye will be the best guide.

After passing this narrow place the depth of water increases to 10 and 12 fathoms.

The inside western point of the channel is called Mangle Prieto point, and bears N. from Practicos point, the outer eastern one. This channel is one of the best fishing-grounds on the S. side of Cuba.

An abundance of fish can be caught either by trolling or bottom fishing, or by hauling a seine. The beach on the western side is also frequented by turtle.

Fish.

Fishermen, whose services are always available as pilots, live about $\frac{1}{2}$ a mile eastward of Practicos point.

Pilots.

After entering, a N. course will lead between Bergantin and Manuel Gomez cays. The first of these lies 6 miles N. of the E. end of Caballones or Llana cay, which forms the western side of the channel. From these cays a N. by W. course for 18 miles will carry the vessel up to the NE. end of the Yagua shoal, and from here a NW. course for 18 miles farther leads to the mouth of the river Jatibonico. The aid of a pilot will be necessary for a stranger.

Anchorage.

The best anchorage for small craft is 1 mile N. of Practicos point, with a depth of $2\frac{1}{2}$ fathoms; sheltered from all winds except those from S. to WNW., which are very rare. Should the wind come out from these unusual directions, a vessel can easily find shelter under one of the cays.

Tides.

The tides in these channels are strong and irregular, and vessels should therefore anchor at night, which they can do safely almost anywhere. The currents set in and out of the Boca Grande with a velocity of from 1 to $2\frac{1}{2}$ miles.

Winds.

Close in to the Cuban shore the wind draws more to the northward in the early morning than at any other time of the day, hauling to the eastward as the sun rises. The lard-breeze commences shortly after sunset.

A short distance W. of the mouth of the river Jatibonico is the point of the same name, and from here to point Pasabanao, 6 miles to the westward, the coast is swampy and covered with mangroves. Between these two points is a bay with a depth of $2\frac{3}{4}$ fathoms of water. From point Pasabanao the coast runs WNW. 6 miles to point Manati. Between these two points is the mouth of Caobas creek, with a depth of 1 fathom. From point Manati to point Tolete the distance is 6 miles W. by N., and between them the coast forms a bay, at the head of which empties the Estero Nuevo.

South of Manati point, at a distance of 8 miles, is the northern extremity of an extensive bank, called Médanos de Manati, separated from the mainland by a channel with from $6\frac{1}{2}$ to $8\frac{1}{2}$ fathoms of water in the middle of it, the depth diminishing toward the sides.

Medanos de
Manati bank.

Between Tolete point and Zarza point, $4\frac{1}{2}$ miles WNW. of it, the coast forms a bay, with a shallow creek, called the

Estero de San Marcos, emptying into it.

The Zarza river, which empties a short distance E. of the point of the same name, is navigable for boats for a considerable distance. Rio Zarza.

Its water is not fit to drink.

The town of Sancti Spiritu is on its bank, 26 miles from the mouth. South of Zarza point, at a distance of 2 cables, are two small cays, from which a reef stretches off 1 mile to the eastward. Between these cays and the shore there is a snug, well-sheltered anchorage for small vessels, with a depth of 3 fathoms, clayey bottom. Town of Sancti Spiritu.

Between Zarza point and Caney point, 3 miles to the WNW., is the port of Tunas, a small bay with a depth of from $2\frac{3}{4}$ to $4\frac{1}{2}$ fathoms, with a bottom of clay and weeds. Port Tunas is the seaport of the city of Sancti Spiritu, with which it is connected by a railroad. Port of Tunas.

Vessels bound to Tunas will find the Trinidad range of mountains, which can be seen for a distance of 30 miles, a good landmark; also, the range of mountains to the eastward, separated from the Trinidad range by low land.

When the eastern mountain, known as Loma de Banao, bears N. by E. it may be steered for, and the bank entered upon in 6 fathoms of water, 5 miles from Zarza de Fuera cay and 8 miles from Machas de Fuera cay.

These cays are on the bank, are both low and covered with small trees and mangroves, and may be seen 8 or 10 miles.

The bank is clear of danger to within three miles of the southern or Zarza de Fuera cay, and to within 2 miles of Machas de Fuera cay. Entering upon the bank with Loma de Banao bearing N. by E. the course to Tunas is NE. $\frac{1}{2}$ E. 6 miles, leading to the entrance of the harbor.

The soundings on the bank will be at first 6 and 7 fathoms, and then 5, 4, 6, 8, and 10 fathoms will be obtained, followed by a decrease to 5 and 4 fathoms until the port is reached. As the land is neared, the harbor will be recognized by Blanco Zarza cay, which lies to the westward of it. This is a small island with a lagoon in the centre, covered with trees, and having a white sandy beach. A few huts are on the eastern end, where, it is said, pilots may be procured. Another good mark is given by the tall chimneys

of the sugar-mills, situated on the coast to the eastward of the port.

Blanco Zarza cay makes two channels, both of which appear to be easy to navigate. The one to the northward of the island is the better, the deepest water being midway between the island and the main land. Boats sounding in this channel got no less than three fathoms, and information was obtained from the captain of the port and from the captains of trading-vessels that this depth is carried by all who know the channel.

If pilots cannot be obtained, strangers will find it advisable to send boats ahead to sound the channel.*

Embarcadero
del Mangle.

To the westward of Caney point is the Embarcadero del Mangle, frequented only by smugglers, and 6 miles farther to the westward is Ciego point. In the bight between these two points there are from 3 to $4\frac{1}{2}$ fathoms of water. At the head of the bight is the mouth of the river Tallabacoa, dry except during the rainy season. From Iguanojo point, $\frac{1}{2}$ a mile W. of Ciego point, a reef extends $\frac{1}{2}$ a mile to seaward.

Rio Tallabacoa.

Water.

Good water may be obtained from a brook running through a ravine a short distance W. of the Tallabacoa river, and also from a small water-course which empties just to the westward of Ciego point. The river Iguanojo, which empties near the point of the same name, furnishes excellent water about 3 miles from its mouth.

From the mouth of the river Iguanojo the coast takes a WNW. direction for 4 miles, when it turns abruptly to the S. for 2 miles, terminating in Agabama point.

Agabama point.

From this point a narrow reef runs off 6 miles to the SE., forming, with Iguanojo point, a deep bight, called San Pedro bay, having a depth of $3\frac{1}{2}$ to $5\frac{1}{2}$ fathoms, with muddy bottom.

San Pedro bay.

On the reef stretching off from Agabama point is a cluster of small islets, called the Tierra cays, with another small islet, called Machos de Afuera cay, $2\frac{1}{4}$ miles from the edge of the reef and $2\frac{3}{4}$ miles SSE. of the Tierra cays.

Tierra cays.
Machos de
Afuera cay.

From Machos de Afuera cay a reef stretches off nearly 2 miles to the eastward.

Agabama river.

Near Agabama point the river of the same name empties.

* Commander H. L. Howison, U. S. N.

Its water is brackish for a distance of 18 miles from the mouth.

From Agabama point to point Casilda the coast is a mangrove swamp; from the latter point to point Guaurabo it is of sand and steep rocks.

There are some high mountains 10 miles inland, called the Sierras de Sancti Spiritu. Two of the peaks higher than the rest serve as useful landmarks. The most northeasterly of these two peaks is called the Pan de Azucar, lies 16 miles inland, and may be recognized easily by its flattened summit.

The Loma de Banao is another peak lying 4 miles SW. of the Pan de Azucar. Still another remarkable peak, called the Pico del Potrerillo, lies 20 miles W. of the Loma de Banao and 4 miles NNW. of the city of Trinidad. It is an excellent landmark, being visible 60 miles off.

The city of Trinidad is one of the most important on the S. side of Cuba, having a population of over 10,000. It is situated on high land, 3 miles from the sea and about $\frac{1}{2}$ a mile from the left bank of the river Guaurabo, which is only navigable for boats. Imports and exports are landed and shipped at the harbors of Casilda and Masio, the former lying $2\frac{1}{2}$ miles and the latter $4\frac{1}{3}$ miles from the town.

The town lies on the slope of a remarkable saddle-shaped mountain, and in approaching from seaward a church, 700 feet above the sea, is a conspicuous object. When the mountain behind the town is seen from the W. or SW. it has the shape of a gun-quoin, and can be seen at a distance of 30 miles.

Point Maria Aguilar lies about 10 miles WNW. from point Agabama, and between them the shore line is deeply indented, forming four small bays, of which the easternmost, called Jobabo, is only fit for small coasters. The next one, Caballones cove, has a depth of 17 to 23 feet. Port Masio, extending farther to the northward, has the deepest water, and port Casilda, the westernmost, has a depth of 21 feet. There are numerous cays, reefs, and banks lying from 2 to 3 miles off shore, and the channels separating them, although deep are intricate, and require the assistance of a pilot. The weather-channel lies between Machos de Fuera cay and a small reef lying $\frac{1}{2}$ a mile to the west-

ward, and has a depth of 3 fathoms; but this channel is not to be recommended, as the sand-banks are said to change.

Two miles to the westward of Machos de Fuera cay is Puga cay, over which the sea sometimes breaks, and from which a reef extends to within 1 mile of Blanco cay.

Cayo Blanco.

The shores of this latter cay, as its name imports, are formed of white rock and sand. It is a small low islet, 22 feet high, covered with trees, and with a lagoon in its center. It lies $2\frac{1}{2}$ miles NW. of Puga cay. On its northern end is a flag-staff, and near it several huts, where pilots live. From here the eastern part of the Loma de Banao bears NE. $\frac{1}{2}$ E. and the Pico del Potrerillo NW. by N. $\frac{1}{2}$ N. The best channel lies between cayo Blanco and cayo Puga, and has a depth of $9\frac{1}{2}$ fathoms.

Anchorage.

In case of having to wait for a pilot, as is probable, anchorage in $9\frac{1}{4}$ fathoms may be had with the city of Trinidad bearing NW. by N. and cayo Blanco bearing NE. distant 1 mile. Before anchoring a clear spot should be selected.

Soundings appear to extend to some distance from the reefs, and close up to cayo Blanco there are 5 fathoms of water.

From the western end of the cay a reef extends for a distance of 3 cables, but it may easily be seen and rounded, and good anchorage will be found with a depth of 3 fathoms to the NW. of the cay.

If bound for Trinidad, after passing Zarza de Fuera cay, instead of entering on the bank of soundings, steer about NNW., and, after sighting Machos de Fuera cay, keep away WNW. for Blanco cay. When the Pan de Azucar is on with the Loma de Banao, Machos de Fuera cay will bear N. The knowledge of this fact may assist a stranger to recognize the land.

Port Masio.

Of the ports of Trinidad, Puerto Masio will be found the most convenient for a sailing-vessel, as it can be entered and left with any wind. Neither this harbor or Puerto Casilda is suitable for vessels drawing more than 15 or 16 feet. For larger vessels the best anchorage will be found in from 3 to 4 fathoms of water, with Blanco cay bearing W. by S. and Puga cay S. by E.

In entering Puerto Masio or Puerto Casilda the shoals can generally, in clear weather, be seen from aloft. To

enter Puerto Masio, take the channel 1 mile wide between Blanco cay and the reef off Puga cay. The eastern end of the former cay should be passed at $\frac{1}{4}$ of a mile distance. After passing these cays, if obliged to wait for a pilot, good anchorage will be found, with Blanco cay bearing W., in 3 or 4 fathoms of water.

If intending to proceed without a pilot, bring the southern end of Blanco cay to bear W. and the middle of Puga cay to bear SE. by S., and from this point steer NW. This will lead between the ledge off the NE. end of Blanco cay, on the port hand, and Cascajal reef, nearly awash on the

Cascajal reef.

Jobabo point may be known by a sandy beach on it, and as soon as it bears N., haul up NNW., steering for the western point of entrance of Puerto Masio, avoiding by the eye the shoals on either side. In standing in toward the middle of the harbor it is only necessary to keep clear of a shoal extending from the landing-place on the W. side of the harbor. In standing in for Puerto Masio, the small bays of Jobabo and Caballones will be left on the starboard hand. To enter these bays it is only necessary to keep half way between the points of entrance, anchoring in $2\frac{1}{2}$ or 3 fathoms of water; muddy bottom.

Jobabo and
Caballones bays.

To enter Puerto Casilda there are three channels: the first, E. of Blanco cay; second, W. of the same cay, and the third, called the Mulatas channel, close to the eastward reef of that name.

Merchant-vessels are obliged to take a pilot at Blanco cay.

If not able to obtain a pilot the following directions may be of service. A boat sounding ahead will afford assistance.

Until within a mile to the southeastward of the entrance to port Masio the channel to port Casilda is the same. From this point steer $\frac{1}{4}$ of a mile WNW. through the narrowest part of the channel carrying 16 feet of water, leaving, about 200 yards off on the port hand, a stake, planted in 10 feet of water on the end of a reef; then steer SW. by W. 2 miles, passing on the S. side of Guayos cay, when port Casilda will be well open, then steer NNW. for 2 miles, to the entrance of the harbor, keeping the western shore

aboard to avoid the long sand spit making out from the eastern side of the entrance.

The anchorage is in from 16 to 25 feet of water; muddy bottom. The stakes marking the channel are frequently changed by the pilots, to keep strangers from learning the pilotage.*

Mulatas chan-
nel.

Mulatas channel is shorter than the one just described, and it is said to have a depth of 15 feet, but the aid of a pilot is necessary.†

To enter this channel, keep close along the reef from abreast of Blanco cay, steering to the northwestward and keeping well off from the breakers, which are easily seen, until a remarkable white house called the Vigia, on the hill above the town, bears N. The end of the reef is generally marked by a beacon, planted in 14 feet of water $\frac{1}{4}$ of a mile E. by S. $\frac{3}{4}$ S. from the Mulatas rocks. Leave this stake on the port hand and steer NE. $\frac{1}{2}$ E. along a row of stakes leaving them to starboard. From 200 to 400 yards off from these stakes, not less than 11 feet of water will be found. Cay Guayro will be seen on the starboard bow, and when it bears E. by N. $\frac{1}{2}$ N. a N. $\frac{1}{2}$ E. course may be steered, which will lead close to the middle bank. This bank may be passed on either its N. or S. side, and a course shaped for the anchorage.

Port Casilda.

Casilda harbor is only 800 yards wide, and although it is 2 miles nearer Trinidad than port Masio, a vessel will have to send to the Guarabo river for water. There are other channels leading to Casilda, but they are somewhat foul, and there are no good leading marks for them. The assistance of a pilot is therefore necessary. If it should be necessary to heave-to outside for a pilot, the port should not be brought to the eastward of ENE., in order to avoid the Mulatas reefs, extending to the westward of the port.

Tug-boats can generally be obtained to assist vessels in calms and light head-winds.

The tides in the channels runs to the SW. and NE. with a strength of half a mile an hour, rising and falling $1\frac{1}{2}$ feet, but after a SE. wind the rise and fall is 3 feet.

* Com'dr. H. L. Howison, U. S. N.

† H. M. S. Woodlark, 1875.

If it is only desired to communicate with the town of Trinidad, a conveniently accessible anchorage will be found at the mouth of the river Guarabo, 3 miles to the westward of the town. This anchorage is, however, entirely open to the SW. To enter it keep on to the NW. past the entrance of the Mulatas channel, and, after hauling around point Maria Aguilar, keep close along the shore till the town bears E., when the bay will open out. Ciriotes point, the southern limit of the bay, should be passed at a distance of 300 yards, and a good berth will be found in 8 fathoms with this point bearing S.

Although the bay appears roomy, there is only room for one vessel, the bottom being strewn with rocks, on some of which there is only 6 feet of water.

This place will be found a convenient anchorage for communicating with Trinidad, as it will be only necessary to pull 3 miles up the river as far as a bridge which lies only $\frac{3}{4}$ of a mile from the town.

There is an inside channel from the ports of Trinidad to Santa Cruz, smooth and well sheltered with numerous excellent anchorages. The assistance of a pilot is, however, indispensable.

The Paz bank, lying about 20 miles off shore, is 10 miles long, WNW. and ESE., $3\frac{1}{2}$ miles wide at the eastern end, which is the broadest. It is of a pear-shape, with a depth from 12 to 20 fathoms.

The NW. end is rocky but the eastern end is sandy, and in moderate weather a vessel may anchor on it. The centre of the eastern end of the bank bears S. $\frac{1}{2}$ W., $15\frac{1}{2}$ miles from Machos de Fuera cay, and SW. by W. $\frac{1}{2}$ W., 13 miles from Zarza de Fuera cay.

From the river Guarabo the coast trends W. by N. for 8 miles to Muño point, just west of the river Hondo, then inclines a little more to the northward for 9 miles to the river San Juan, 1 mile beyond which is the mouth of the river Guayximico. The shore is steep-to, and formed by soboruco bluffs, backed by high lands as far as San Juan point, where the Trinidad range of hills terminates. The coast is everywhere clear of danger except between the rivers San Juan and Yoguanabo, where a reef stretches $\frac{1}{2}$ a mile off shore. Along this part of the coast are the rivers Guanayara, Cu-

Guarabo anchorage.

Paz bank.

bagan, Hondo, Yoguanabo, and San Juan, navigable for a short distance for coasters drawing 6 feet of water. Three miles from the mouth the water of these rivers is drinkable.

From the Guayximico the coast runs NW. for 14 miles to Colorados point, which may be passed at the distance of 100 yards. The shore is flat, without mountains or hills, the small and unimportant rivers of Gavilan, Gavilancito, and Arimao emptying into the sea.

Cienfuegos.

The harbor of Cienfuegos or Xagua is spacious and deep enough for the largest ships, but the entrance is narrow and crooked. Between point Colorados on the E. and point Sabanilla on the W., the entrance is 1 mile wide, but at 2 miles from the mouth it narrows to a little more than 200 yards and sharply changes its direction from NW. to NNE. and does not again widen till reaching point Milpa, the eastern interior point of the entrance channel, where it opens out into a large and well-sheltered harbor.

The town of Ferdinanda de Xagua or Cienfuegos is built on a peninsula on the eastern side of the bay. This peninsula separates two large bays, each affording excellent anchorage.

Vessels discharge into lighters till their draught is reduced to 10 feet, when they can haul alongside of the wharf.

All sorts of ship-stores, including coal, may be obtained here, and repairs to a vessel's hull or steam-machinery may be effected.

A loop of the submarine telegraph cable, extending from Santiago de Cuba to Batabanó, is landed here.

Light.

From a tower 45 feet high on point Colorados a *fixed* and *flashing white* light is exhibited 82 feet above the sea and visible 14 miles in clear weather.

Pilots are always ready to board vessels off the entrance to the harbor. The pilotage for a three-masted vessel is \$32, for a brig or schooner \$20.

Tow-boats may be had if desired. Water delivered alongside the ship costs two cents a gallon during the rainy season and three cents during the dry season.

In entering the harbor of Cienfuegos give the shore east of Colorados point a berth of 1 mile, but the point itself may be passed within 50 yards. Then keep in mid-channel all

the way to where the shores separate to form the bay. The eastern interior point is called point Milpa, and off it a spit extends for a $\frac{1}{4}$ of a mile with 8 feet of water on it. N. of point Milpa is the bank of the same name, to avoid which steer for the SE. end of Carenas cay as soon as Milpa point is abeam. When the N. point of Alcatraz cay bears E. Milpa bank is passed and the vessel may anchor, if desirable, in 7 or 10 fathoms of water.

If intending to proceed farther, Carenas cay should be passed on the starboard hand, as a long spit connects it with the northern shore. The assistance of a pilot will be necessary, as, although the edges of the banks and shoals are generally marked by stakes or beacons, they are liable to be changed and cannot be depended upon.

It is high water, full and change, at Cienfuegos at 4^h 57^m, the tide rising and falling about two feet.

In the entrance channel the tide runs 3 miles an hour.

From Cienfuegos the coast takes a westerly direction for 21 miles to point Caleta Buena, then turns to the northward for 7 miles to Orientale point, the eastern limit of Cochinobay. The shore is formed of soboruco bluffs steep-to and perfectly clear of danger.

Xagua bank is a coral formation 5 miles long E. and W. and 4 miles wide, and with a shoal spot near its NE. extremity, on which there is only 13 feet of water. The centre of the bank lies S. by W. 26 miles from Cienfuegos light-house. Xagua bank.

The northern edge of the bank is steep-to, but on the southern side the depths shoal more gradually, and the navigator is warned by the change in the color of the water. From the shoalest spot San Juan peak bears NE. $\frac{1}{2}$ N.

Cochinos bay lies between point Cochinos on the E. and point Padre 7 miles to the WSW. It extends about 13 miles to the NNW., and is about 4 miles wide. The eastern shore is formed by soboruco rocks and steep-to. Half a mile from the northern extremity of the bay there are 14 $\frac{1}{2}$ fathoms of water, with a bottom of rock and sand; the depth rapidly diminishing toward the beach. On the western shore there are sand-beaches with a narrow bank of soundings and rocky bottom.

In the northern part of the bay there is a landing-place, but no good anchorage, as the bottom is rocky.

Piedras cay and reef.

Padre point is low and sandy, and from it a reef extends nearly 7 miles in a SE. direction to cay Piedras, which is low and small. The reef is steep-to and intersected by several narrow cuts through which depths of 16 to 22 feet may be carried. The best one is close to the northward of the cay. From here the reef extends in a W. by N. direction to the Lavanderas rocks, 13 miles distant, and lying $1\frac{1}{2}$ miles S. of the eastern end of Blanco cay.

Light.

On the N. part of cay Piedras a fixed white light is shown from a mast on the keeper's house. The light is 30 feet above the level of the sea and in clear weather can be seen 7 miles.

The coast to the westward of Padre point as far as Don Cristobal point, a distance of 36 miles, is very low, swampy, and bordered by cays covered with mangroves.

The largest one of these, called Blanco cay, is 10 miles long ESE. and WNW., and its western end, lying 16 miles from point Padre, forms, with a small cay to the NW., a shallow channel called the Boqueron del Cavalario. On the eastern end of Blanco cay good water may be obtained by digging wells in the sand.

To the westward of Blanco cay the shore inclines to the northward, forming the bay of Cazonas, extending 7 miles in a NW. by W. direction. The water is shallow and the western shore is formed by a line of low mangrove cays, terminating in Diego Perez cay, 6 miles west of cay Blanco.

There are some natural wells of good water on the northern end of Diego Perez cay. Fish and game are said to abound here.

Jardinillos bank.

The NE. edge of the Jardinillos bank commences $1\frac{1}{2}$ miles ESE. of the southern point of Diego Perez cay, extending thence 31 miles in a southeasterly direction to East rock, the easternmost danger of the bank. East rock is united by a reef about 200 yards long to East Guano cay. The edge of Jardinillos bank is perfectly steep-to, showing only one or two sand-banks above water, and, although the edge of the bank is nearly awash, the sea does not always break on it. A bank of soundings, with a depth of from 7 to 14 fathoms

of water, extends 11 miles to the SE. of East rock, with an average breadth of 4 miles.

The Jardinillos bank forms the SW. side of the gulf of Cazones, to be avoided by sailing-vessels on account of its frequent calms and strong currents.

To the westward of Diego Perez cay a chain of low mangrove cays, only a few of which are laid down on the chart, extends in a WNW. direction for 15 miles. The larger of these, called the Flamenco, Bonito, Palanca, and Fabrica cays, make the N. side of a channel between them and the Jardinillos bank, through which at least 10 feet of water, and probably a little more, may be carried.

To the westward of this chain of cays is a numerous group, called the Juan Luis cays, to the eastward of which the channel leads.

From Cazones bay to the westward the shore is low, marshy, and much indented, forming several small bays and points of no importance. It takes a general WNW. direction to Gorda point. There are numerous channels for small vessels among the numerous cays along the coast and between them and the shore, but there are no leading-marks which a stranger could recognize, nor does any intelligible and accurate information regarding them exist. The numerous large steamers running along the S. coast of Cuba from Batabanó to Cienfuegos and Santiago de Cuba are all furnished with skilful pilots, but no general information can be procured from them respecting the navigation.

From Gorda point the coast turns to the northward for 20 miles; then sweeping round to the E., N., and NW., forms the bay of Broa, the western limit of which is Mayabeque or Pajaros point, 15 miles N. of Gorda point. The shores of the bay are covered with mangrove swamps, through which the river Jatibonico and numerous other small streams empty.

Broa bay.

The general depth of water in the bay is from 3 to 4 fathoms. At Rosario, 6 miles to the eastward of Mayabeque point, and at Caimito, 8 miles farther to the ESE., piers have been built to facilitate the loading of coasters.

From the Mayabeque river, $1\frac{1}{2}$ miles to the NW. of the point of the same name, good water may be easily obtained.

Nine miles to the westward of the river Mayabeque is the roadstead of Batabanó, a place of constantly-growing im-

Batabanó.

portance as the port through which nearly all the communication of Havana with the southern coast of the island takes place. A railway leads from here to Havana, and the submarine telegraph-cable is here connected with Havana by land lines.

The channels leading to this port only admit the passage of vessels drawing 12 or 13 feet of water and the anchorage is entirely exposed to SE. winds. There are but a few scattered buildings on the shore, the town of Batabanó lying 3 miles inland.

Light.

A fixed white light is shown from a lantern hoisted on a mast at a height of 31 feet and can be seen 3 miles.

The great gulf of Batabanó lying between Padre point on the E. and Mangles point on the W., a distance of 160 miles, is bordered on the S. side by the Jardinillos bank, the isle of Pines and the islands known as the Mangles, Indian, and San Felipe groups.

To the northward of these groups are almost innumerable cays and sand banks, as yet very imperfectly known and forming numerous and intricate channels. To navigate these channels and to identify the cays used as land-marks local knowledge is positively necessary. The principal channels leading to the road of Batabanó are from the eastward the Gorda channel between the mainland and the Juan Luis cays, from the southward the Rosario channel along the western edge of the Jardinillos bank, and from the SW. the channels between the isle of Pines and the Indian cays, between the Indian and San Felipe cays, and between the latter group and the mainland. A vague description of these channels is given in the *Derrotero de los Antillas*, but it is manifestly incorrect in many particulars and indicates that no channel exists having more than 9 feet. Pilots and masters of steamships running constantly to Batabanó have, on the contrary, assured the writer that vessels drawing 11 feet can go there with safety.

Pilots may be obtained at Cienfuegos or at the isle of Pines.

From Batabanó the coast is low and irregular in outline, taking a general westerly direction for 24 miles, when it trends to the SW., forming Majana bay.

It is marshy as far to the westward as the mouth of the river Guanima, 20 miles from Batabanó.

From Majana the coast somewhat indented by bays and lagoons takes a general SW. direction for 48 miles to Fisga point. Access to this part of the shore is much impeded by banks and shoals, which in some places extend off as much as 7 miles. Numerous rivers of no special importance empty into the sea, affording shelter within their mouths to droghers and fishing-boats.

From Fisga point the coast, low, swampy, and much indented by lagoons and small coves, takes a general direction for about 22 miles to the mouth of the river Galafre. It then sweeps round to the southward forming Cortes bay, where there are 3 to $3\frac{1}{2}$ fathoms of water.

Nine and a half miles SW. of the mouth of the Galafre is the mouth of the river Guama or Cuyaguatega, and $4\frac{1}{2}$ miles farther to the southward is a chain of five cays sheltering the mouth of the Cortes or Pirate's lagoon. In this lagoon there are 15 feet of water, but only 6 or 7 feet between the cays at the entrance. Fish and turtle are said to be abundant in this vicinity.

One and a half miles to the southward of this lagoon is Piedras point; the coast then sweeps round to the SW. for 7 miles farther to Mangles point, which is low and only to be distinguished by the sudden elbow which the coast makes in turning to the westward. All this part of the coast is foul and bordered by a reef.*

The great archipelago lying S. of the gulf of Batabanó is no longer of the importance which slavers and pirates gave it during the first half of this century. These outlaws found safe retreats for many years among the lagoons, cays, and sand-banks which make navigation so difficult, but these islands are now only frequented by fishermen. It is but very seldom that a man-of-war or a merchant vessel needs any detailed description of this neighborhood, and it must be remembered that no correct and complete survey has ever been made here.

The NE. side of the Jardinillos bank commences about

* The description of the coast from Mangles point to cape San Antonio is continued at page 166.

1½ miles S. of Diego Perez cay, and though somewhat indented, takes a general SE. direction for 32 miles to East Guano cay, lying on the SE. end of the bank. Medano Vizcayno cay lies about midway between these two cays, just within the edge of the bank. This edge is perfectly steep-to; there are some scattered rocks and sand-banks on it just awash, but no opening. The current in the gulf of Cazones is uncertain both as to direction and strength, and the navigator cannot be too careful.

East Guano cay. East Guano cay, lying 35 miles SW. $\frac{3}{4}$ W. of Cienfuegos light-house, is a small islet, 40 feet high. The bottom to the eastward is foul and the bank of soundings extends 11 miles to the ESE., where there are 14 fathoms of water. From East Guano cay the edge of the bank takes a westerly direction for 28 miles to Largo cay. From Trabuco cay, 13 miles E. of Largo cay, there is a chain of high rocky cays lying near the edge of the bank, which is bordered by a reef. Largo cay is 12 miles long, 50 feet high, thickly wooded, and bordered by a reef which extends three miles off from the SE. side of the cay.

This reef extends from the SE. end of cay Largo, about W. $\frac{1}{2}$ S. for 12 miles, and then trends to the southward for 6 miles, forming a narrow sand-spit, at the southern end of which is the Jack Taylor reef.

Jack Taylor reef. This reef, on which the water breaks, is of coral, and 1 mile S. of it there are 12½ fathoms of water, coral, and sandy bottom.

On the sand-spit connecting Jack Taylor reef with the bank there are 5 or 6 fathoms of water, and from its northern end the edge of the bank continues for 5 miles to the westward as far as the Rosario channel.

The cays on the southern edge of the bank, from the isle of Pines to cay Largo, are known as the Jardine group.

Rosario cay, lying 19 miles W. of cay Largo, when first seen from the southward, looks like three islets, the largest one in the middle. It may be known by some sandy cliffs upon it. Cay Cantiles, just W. of it, is wooded, and between these two cays there is a channel leading into the gulf of Batabanó, which has 3 fathoms at the entrance, but is said to be only 9 feet deep, 7 miles farther in.

Rosario cay is said to be frequented by fishermen who resort to it for water and for the cabbage-palm. Water is obtained by digging wells in the sand.

From Rosario channel the edge of the bank turns to the SW. by S., continuing in this direction for about 18 miles to a reef called the Dry Shingle or Cascajo bank. This part of the bank is bordered by a very dangerous reef, and many vessels have been lost on it. Just N. of the Dry Shingle is a reef called the Calapatch Mehagan, a mass of coral just awash, where many vessels have been wrecked. Anchorage may be found in five fathoms of water, sandy bottom, with the Dry Shingle bearing SE. by E. 1 mile distant.* There are soundings about 1 mile outside, in from 5 to 14 fathoms.

There is also anchorage under some of the cays to the eastward of isle of Pines, but in the absence of trustworthy charts local knowledge only can be depended upon, and no trustworthy directions can be given.

The isle of Pines is of irregular shape, about 30 miles in diameter, with a deep bay on the western side, sheltered on the SW. by a projecting tongue of land about 17 miles long.

Isle of Pines.

The southern half of the island is low and swampy, but the northern part is more elevated and in some places mountainous. Very many water-courses and lagoons along the shore are navigable for vessels drawing 7 or 8 feet of water. The island is covered with trees, affording, as its name indicates, pine spars and masts for vessels.

Most of the inhabitants, about 800 in number, live in the northern part of the island where the capital, Nueva Gerona, is situated. Cattle are raised here to a considerable extent.

In making the land from the southward three mountains first come in sight. Of these, the westernmost and highest, called Dolphin Head, or Mount José, appears from the S. as one peak, but from the westward three peaks are seen. It can be seen 45 miles off.

From the SE. extremity of the island, called Piedras point, the shore trends about SW. by W. for 25 miles, and then a little northward of W. for 9 miles to cape Pepe.

The coast is skirted by a reef from one-half to three-fourths

* Commander H. D. Grant, R. N.

of a mile off shore, and the bank of soundings extends about one-third of a mile outside of the reef. The coast near cape Pepe is formed of low white bluffs, and from there it extends about NNW. 2 miles to Cocodrilos bay, where small vessels sometimes anchor.

From Cocodrilos bay the trend of the coast is NW. by N. Port Francés. $9\frac{1}{2}$ miles to Pedernales point, where a small bay called port Francés is situated, the coast beyond it extending in the same direction for 3 miles farther to Francés point. All this coast is skirted by a reef extending about $\frac{1}{4}$ of a mile off shore.

There is good anchorage at port Francés in from 6 to 8 fathoms, with sandy bottom. There are wells of good water here, but the ground is rocky. Wild cattle may be found and plenty of fish.

From Bush cay, just off point Francés, a reef is said to extend for $\frac{3}{4}$ of a mile.

Siguanea bay. The shore from Francés point turns to the SE. for 15 miles and then to the NNE., forming Siguanea bay, the shores of which are generally low and lined with mangrove cays. A bar with only 16 feet of water on it runs across from Francés point to the S. end of the Indian cays, but inside the depths are from $3\frac{1}{2}$ to 6 fathoms and the anchorage excellent. Water may be obtained from springs at the foot of the Siguanea hills.

The tide rises and falls about 6 inches.

Indian river. Indian river lies about 6 miles NNW. of the eastern point of Siguanea bay, in latitude $21^{\circ} 41'$ N. Good anchorage, but exposed to the westward, will be found in $2\frac{1}{2}$ fathoms about 1 mile off shore.

The mouth is nearly closed by a mud bar, but inside depths of from 1 to 3 fathoms will be carried for 4 miles.

Two and a half miles inside the bar the mangrove trees give way to the pines, and a short distance farther up excellent pine spars as large as a frigate's topmast or smaller may be cut so as to fall into the river. At first they are so heavy as to sink, but soon become dry and much lighter.

On the banks of the rivers crocodiles abound and in the woods will be found wild pigs.

From Indian river the coast runs about NW. by N. about 9 miles to Indian point and from there about NNE. to Bar.

cos point, the NW. extreme of the island, and forming the northern limit of the small bay of the same name. From here the coast trends about ENE. for 13 miles to the mouth of the Casas river, which forms the port through which all the business of the seat of government, Nueva Gerona, is transacted with the island of Cuba.

This river is navigable for boats for a short distance, and the water is drinkable about 4 miles from the mouth.

Rio Casas.

On the left bank are the Casas hills. From the settlements beef and pork may be procured, but vegetables are scarce.

From the mouth of this river the coast trends to the eastward for nearly 6 miles to a small peninsula called Monte del Diablo. On this part of the coast are the Caballos hills, of moderate height, and the shore becomes firmer and less marshy than it is to the westward.

From Monte del Diablo the coast sweeps round to the SE., and then takes a southerly direction, forming the eastern coast of the island, the shore being low and marshy. The river Santa Fé empties about 10 miles E. of Monte del Diablo, and to the eastward of its mouth the shore is bordered by reefs and cays.

The numerous cays, islets, and sand-banks lying N. of the isle of Pines, and extending from its N. shore to the mainland of Cuba, are only imperfectly known, and are now only important as obstructing navigation. There are many channels between them fit for small vessels, and which caused them formerly to be much frequented by pirates and slavers and by armed government vessels engaged in hunting out these outlaws.

These cays have few if any distinguishing features by which the navigator may know them, being for the most part covered with mangrove trees and surrounded by reefs.

The Mangles group is the most extensive and numerous, stretching from the NE. part of the isle of Pines for about 30 miles in a NW. direction. Northward of them are the Petatillos sand-banks, and still farther N. and close to the Cuban coast are numerous cays very much alike.

The Indian cays, lying about 6 miles SW. by W. from Indian point on the isle of Pines, form a group 7 miles long NNW. and SSE. The cays are low, wooded, and separated

by narrow channels. These cays are surrounded by reefs which extend nearly 2 miles off shore.

San Felipe cays. San Felipe cays form a group extending about 13 miles E. and W., and lying about midway between the Indian cays and the main-land of Cuba. They are low, marshy, and surrounded by reefs. On the S. point of the eastern cay there is a well of good water near the beach.

Fish and turtle abound.

The tide rises and falls about $2\frac{1}{2}$ feet. The high tide appears to take place in the morning and the low tide at night. The flood sets strongly to the NE.

The coast of Cuba from Mangle's point (see p. 161) to cape Corrientes trends about WSW. It is probably laid down erroneously on the chart, a part at least of it being represented 7 miles too far S.*

It is formed of low white bluffs, thickly wooded, and, as far as is known, is clear of danger.

Cape Corrientes is low and sandy, with a depth of 5 fathoms $\frac{3}{4}$ of a mile off shore. Before the establishment of the light on cape San Antonio, it is said that cape Corrientes was sometimes mistaken for the western extremity of Cuba, but that error could hardly occur now.

Temporary anchorage may be found in 9 fathoms of water, with cape Corrientes bearing E. $\frac{1}{2}$ N. $1\frac{1}{2}$ miles distant.

From cape Corrientes the coast sweeps round to the northward, and then to W. and SW., forming Corrientes bay, 15 miles wide, between Corrientes and Holandes points, and extending 9 miles to the northward.

The shores are bluff, rocky, and steep-to. From Holandes point, off which there is a small reef 300 yards off shore, the coast extends to the westward for 10 miles to Perpetua point, and then sweeps round for 5 miles farther to cape San Antonio. (See p. 168.)

Off Piedras point, between points Holandes and Perpetua, a reef makes off shore $\frac{1}{3}$ of a mile.

Current.

The current off the S. side of Cuba has the same general characteristics as elsewhere in the West Indies, viz, generally setting to the westward, but being seriously influenced both as to strength and direction by the prevailing

* Commander. H. D. Grant, R. N.

winds. Just before and during northers, which blow during the winter months, the current frequently sets to the eastward.

From October to May the NE. trade-winds blow freshly along the S. coast of Cuba, but are temporarily interrupted at times by winds from NW. and N. Winds.

From May to October, however, the prevailing winds are light, and show an inclination to haul round with the sun every day, commencing in the evening with a northerly wind off the land, by day-break veering to ENE., then by noon through E. to ESE., and by 4 p. m. arriving at SW., where it continues till it falls calm and is succeeded in the evening by the land wind.

The strong currents and untrustworthy character of the charts make it incumbent on the navigator to exercise even more than ordinary caution and vigilance while near the land on the coast of Cuba.

CHAPTER V.

NORTH COAST OF CUBA.

Variation in 1876.

Cape San Antonio, $5^{\circ} 25'$ E. | Havana, $4^{\circ} 50'$ E.

Cape Maysi, $2^{\circ} 40'$ E.

In describing the north coast of Cuba, the coast from cape San Antonio to Havana will be treated of and then the coast from cape Maysi to Havana.

Cape San Antonio.

Cape San Antonio, the western extremity of Cuba, is low and covered with trees 70 or 80 feet high. The shore is formed by sandy beaches separated from each other by low, white cliffs. There is no salient point to the westward, the land bending round for 4 miles very gradually.

Light.

Two or three miles S. of the light-house a bank commences which sweeps round the cape about 1 mile off shore and connects with the Colorados reefs. On the sandy beach is a light-house tower 107 feet high, colored white with a black top, and with the word "Roncali" painted on it. From this tower is shown, at a height of 117 feet above the sea, a *white* light, revolving every 30 seconds, and visible 14 miles in clear weather.

Temporary anchorage will be found under the W. end of Cuba, with the N. extreme of the land bearing NNE. and and the S. extreme bearing SE. This anchorage must be approached carefully, as it shoals quickly and the bottom is foul.

Antonio knoll.

The Antonio knoll is a coral-bank about $2\frac{1}{2}$ miles long and 1 mile wide, with a general depth of 14 to 16 fathoms, 11 fathoms being the least depth found. It lies about NW. by N. $\frac{1}{2}$ N., 9 miles from cape San Antonio and 4 miles from the edge of the Colorados bank. Discolored water may be seen in clear weather. About $1\frac{1}{2}$ miles NE. of the knoll is a 10-fathom patch.

Reported shoals.

In 1873 a dangerous shoal with only 2 fathoms on it was reported by the *Comet* as lying $2\frac{1}{2}$ fathoms northward of Antonio knoll, and there is said to be a 4-fathom patch about 3 miles farther to the northwest.

As there is deep water close to all these shoals, great caution must be exercised while in their neighborhood.

The edge of the great bank from which the Colorados reefs rise, commencing 2 miles W. of Cajon point, takes a general northeasterly direction for 120 miles to Bahia Honda. The coast from Cajon point is irregular in outline, taking a general ENE. direction for 35 miles to the entrance of Guadiana bay; then from the N. side of the bay NNW. to Avalo point, forming a deep bight; then curving round to the eastward for 85 miles to Bahia Honda.

About the meridian of 84° W. the land is lofty, forming the mountains called the Sierras de Acosta, about 10 miles inland. Farther to the eastward about the same distance from the shore are the Organos and Rosario mountains. Another useful landmark is the Pan de Guajaibon, 2,532 feet high, in about longitude $83^{\circ} 24'$ W. and 5 miles inland, lying just S. of the pass of cape Blanco.

All the coast from a short distance N. of Cajon point is skirted by dangerous, broken reefs. Coasters of 10 or 11 feet draught pass through the numerous cuts and among the cays inside. The land abreast of the western end of the reef is quite low and cannot be seen from the edge of the reefs. The sea seldom breaks upon them, and the bank of soundings outside is seldom more than a mile wide.

The lead will, therefore, give but little warning, and as the currents are strong and variable this part of the coast should be navigated with great care.

The coast from cape San Antonio to Cajon point, 5 miles NNE. of it, is low and sandy.

NNW. of Cajon point, $1\frac{1}{2}$ miles distant, is a small sand-bank about $\frac{1}{2}$ a mile in diameter, with less than 1 fathom water on it.

Cajon shoal

The SW. point of the reef begins 15 miles NE. $\frac{3}{4}$ N. from Cajon point, and between them is a bank of soundings with from 3 to 6 fathoms on it, sandy and rocky bottom.

Colorados reef.

From its SW. point this portion of the reef runs about NE. $\frac{1}{2}$ N. 26 miles to Buena Vista pass. The reef here is from 2 to 3 miles wide and from 7 to 14 miles off shore, with several detached heads on both its eastern and western sides.

The coast from Cajon point to the Leña or Mangles cays, 4 miles to the westward, forms a bight, open to the northward. The shore is low and clear of danger.

Leña or Man-
gles cays.

The Leña or Mangles cays, a group of four small islets, are low and covered with mangrove-trees. They are separated from each other by narrow channels shallow at the entrances but deep inside.

The largest of these cays is called Punta de Afuera, is low and marshy, and extends $2\frac{1}{2}$ miles E. and W. It is separated from the coast by a bay $2\frac{1}{2}$ miles wide and nearly land-locked, being protected to the eastward by a salient point extending 2 miles from the coast. This point forms with the eastern end of Punta de Afuera cay, the Barcos channel, where vessels drawing not more than 15 feet may find sheltered anchorage.

Barcos chan-
nel.

The points at the entrance of Barcos channel lie E. and W. of each other, a small reef extending from each so as to leave a clear channel 1 cable wide, with a depth of 2 fathoms; muddy bottom at the entrance. Inside, the channel deepens to $4\frac{1}{2}$ fathoms, widening at the same place to $2\frac{1}{2}$ cables, again narrowing and shoaling as a small submerged cay is approached.

This small cay forms a channel about 6 feet deep by which small vessels may reach the bay above mentioned. The Barcos channel is $1\frac{1}{2}$ miles long. To enter it a sailing-vessel needs a fair wind, but the entrance has no danger, and inside a vessel may anchor as convenient, there being 5 fathoms of water close to the mangroves.

There are several small cays having only boat-channels between them in the bay to which the Barcos channel leads. The general depth is from 6 to 9 feet.

Leña and Re-
bellines cays.

To the westward of Punta de Afuera cay are three other small mangrove cays, the northern and smallest of which is called Leña cay, the others the Rebellines. The latter, lying about a quarter of a mile off the coast, have a small reef running off the southern side.

Anchorage may be found to the southward of the Rebellines, sheltered from northers, in about 2 to $2\frac{1}{2}$ fathoms of water, muddy bottom.

Near the shore there are some rocky heads.

From the Leñas cays the coast trends about ENE. for 5 miles to Guanah point, then in the same direction about $3\frac{1}{2}$ miles farther, to Caravela Chica point, to the northward of which, at the distance of $\frac{1}{2}$ a mile, there are several rocky heads, with only 3 feet of water on them; but from this point the coast, as far as Plumajes point, is clear of danger.

Between Caravela Chica and Plumajes points, 10 miles apart, there are several small coves of little consequence.

Plumajes point is formed by a bluff 2 miles long. This bluff, although not high, is sufficiently so, compared with the land in its vicinity, as to be easily distinguished.

Plumajes point.

From the eastern end of this bluff a reef extends $\frac{3}{4}$ of a mile to the ENE., and rocky ground extends 2 miles farther in the same direction.

Tolete point lies 4 miles E. of Plumajes point; $4\frac{1}{2}$ miles farther in the same direction is Guadiana point, forming, with Algodonal point, $\frac{3}{4}$ of a mile to the northward, the entrance to the bay of Guadiana.

Tolete point.

This entrance is narrowed by mud-banks, extending from both sides toward the middle of the channel and contracting its navigable portion to a width of from 1 to 2 cables, with a depth of from $3\frac{1}{2}$ to 7 fathoms of water as far as the entrance to an arm of the bay extending to the ENE.

The general shape of the bay is circular, with a diameter of about 4 miles.

An excellent anchorage, sheltered from all winds, will be found in the centre of the bay, with a depth of $3\frac{1}{2}$ to 4 fathoms.

Just inside of a beach on the northern shore, is a lagoon affording good drinking water.

The river Guane Guamas, or Guadiana, empties into the NE. part of the bay. Near its mouth, on the northern shore, is Geronimo point, off which a reef extends $\frac{1}{4}$ of a mile to the SE.

River Guane.

The river has a depth of about 7 feet, but is so narrow and crooked that boats only can navigate it. The towns of Guane and Paso Real export from here, hides, wax, and tobacco.

Towns of
Guane and Paso
Real.

Between Algodonal point and Colorado point, $3\frac{1}{2}$ miles to the NNW., the coast forms a small bay. From the latter

point, a sand-spit extends off $\frac{3}{4}$ of a mile in W. by S. direction.

Three and a half miles NW. $\frac{1}{2}$ W. of Colorado point is Pinalillo point; Garnacha bay lying between them.

Between Algodonal and Pinalillo points the coast is of moderate height and covered with pine trees.

Garnacha bay. Garnacha bay, although exposed to westerly winds, affords good anchorage, gales of wind from that quarter rarely blowing. The holding ground is good, the bottom being muddy. In the centre of the bay, $1\frac{1}{2}$ miles off shore, there is a depth of $1\frac{1}{2}$ fathoms at high water. There are only 6 feet of water at low tide, at 2 cables off shore, so that lighters cannot reach the landing-place at that time. On the shore is a small beach, with roads leading from it toward the towns of Mantua, Guane, and Pinar del Rio.

Mantua, the largest of the three, is also the nearest, being 18 miles distant.

Water. During the rainy season, water may be had from a lagoon near the beach; in the dry season it is procured from the Santa Lucia river, which empties into the bay.

Avalos point and anchorage. Pinalillo point is foul. Four and a half miles NW. by N. from it is Avalos point, a low, narrow tongue of land extending more than 1 mile to seaward. Under its shelter is a good anchorage, protected from northers.

Between Pinalillo and Avalos points is a bay 2 miles deep, with an inner arm or cove on which is situated the landing place of San Francisco.

From Avalos point the coast, forming several small coves, takes a general NNE. direction for $10\frac{1}{2}$ miles to the mouth of the river Buena Vista.

From Algodonal point to this river the coast is believed to be clear of danger.

Pass of Buena Vista. The pass of Buena Vista is the most southerly of the openings in the Colorados reefs and is about 26 miles from their SW. extremity.

The opening lies about 4 miles NNW. from the NW. end of the cay of the same name.* According to the latest au-

* *The Anuario del Depósito Hidrográfico* for 1870, p. 319, says that this opening lies $1\frac{1}{4}$ miles NW. of Buena Vista cay, differing from the *Derrotero de las Antillas* and both differing essentially from the British Admiralty charts.

thorities this pass has only 2 fathoms of water in some places and is only 1 cable wide. To enter it, bring the western point of Buena Vista cay to bear SE. and steer for it, carrying a depth of from 2 to 4 fathoms of water as far as a bank of whitish clay with hardly 2 fathoms of water on it. After passing this bank haul up E. till the eastern point of the cay bears SE., when a palm-tree beacon will be seen on the edge of the Buena Vista bank. This beacon should be left on the starboard hand and after passing it a vessel may steer for Arroyos anchorage without danger.

Buena Vista cay is $4\frac{1}{2}$ miles long from E. to W. and 1 mile wide. Off its NW. point is an islet, and another called Buena Vista cay. Abra cay off its northern side. Buena Vista cay is low and swampy and divided in the middle by a creek navigable for boats. A mud-bank extends 1 cable off its NW. point, on the extreme of which is planted the beacon above mentioned.

The channel between the cay and the Cuban coast has a depth of a little more than 6 feet and forms a short cut for small steamers and coasters of that draught. The channel is marked by beacons, but no definite instructions can be given for it. North of Buena Vista cay, at the distance of 1 mile, there is a bank 5 miles long NE. by N. and SW. by S., 1 mile wide, with 5 feet of water on each end.

There are channels between it and the neighboring reefs.

Between the mouth of the Buena Vista river, the cay of the same name, and Ingleses point on the Cuban coast and farther to the southward, is the anchorage of Arroyos, having a depth of 3 fathoms, gradually diminishing toward the shore, and sheltered from all winds from NW. round by E. to SW. Arroyos anchorage.

This is the principal port of the town of Mantua, 9 miles inland, and has a wooden wharf where coasting-vessels load and discharge their cargoes.

From Buena Vista pass the reef takes a NE. by E. direction to the Rapado pass, $\frac{1}{2}$ a mile wide, with a depth of $1\frac{3}{4}$ fathoms, rocky bottom. To enter this channel, run along outside the reef till abreast the middle of a small sandy beach on the NE. end of Rapado cay, when haul up directly for the beach. The channel may be known by the dark color of the water.

Rapado pass.

Rapado Grande
cay.

Rapado Grande cay lies about 6 miles northward from Buena Vista cay. It is 3 miles long NE. by N. and SW. by S. and is mostly covered with a mangrove swamp. From the northern point of the cay a reef extends 3 cables to the northward, covered with 9 feet of water, and from the western point a similar reef extends 2 cables toward the NW.

On the Cuban coast, 3 miles S. of this cay, is a place called Canas, where coasters load and discharge cargoes. The passage between the cay and the coast is navigable only by vessels of very light draught—4 feet or less.

Vinageras reef
and passage.

Two and one-half miles W. of the western end of Rapado Grande cay is a rocky ledge covered with 6 feet of water, called Vinageras reef. The passage of the same name lies between Rapado Grande and Enllabado cays, and leads to the small anchorages of Caua, Santa Isabel, and Santa Maria. This passage is 1 cable wide, with a depth of 10 to 11 feet.

Toro and Vaca
cays.

Southwest of Rapado Grande cay, and close to it, are two small cays called Toro and Vaca.

Northeast by E. from Rapado Grande cay a chain of mud banks, four in number, extends for a distance of 6 miles. The passages formed by these banks with Rapado Grande and Diego cays are 1 mile wide and of moderate depth, (2 to $2\frac{1}{2}$ fathoms,) but small vessels only can pass between the banks.

Rapados Chicos
cays.

South $\frac{1}{2}$ E. of the western point of Rapado Grande cay are four small swampy cays called the Rapados Chicos.

The largest of them is called Enllabado cay.

The passages N. and S. of these cays have from $1\frac{1}{2}$ to 2 fathoms of water.

Beacons.

The channels between the cays and banks leading to the anchorages in this vicinity have been marked with palm-tree beacons, but these marks are not so permanently placed as to make it worth while to describe their present locations.

Coast line.

From the mouth of the Buena Vista river the coast trends NE. by N. to the northern point of Santa Isabel landing, thence with an irregular outline 3 miles farther N. by E. to the N. point of Canas landing, and then trends E. by S. 1 mile to the head of Santa Rosa bay.

From these landings coasters carry to Havana considerable quantities of tobacco, lumber, wax, and honey.

From Santa Rosa bay the coast runs NNE. $6\frac{1}{4}$ miles to Tabasco or Tabasco point. From this point a reef runs off $1\frac{1}{2}$ cables to the NW., marked by a barrel-shaped buoy moored in 8 feet of water. Outside of this buoy, at $\frac{1}{2}$ a cable's distance, there are 13 feet of water. Tabasco point.

Diego cay lies 3 miles SW. by W. $\frac{3}{4}$ W. from Tabasco point. It is $1\frac{1}{2}$ miles long E. and W., and 1 mile wide. A rocky ledge, on which there are from 5 to 6 feet of water, extends for $\frac{3}{4}$ of a mile to the NW. off the northern end of the cay.* Diego cay.

On this reef ENE. of Diego cay are two small swampy cays, called the Eslabones, close to the Cuban shore, and about $\frac{1}{4}$ of a mile to the eastward of these two more small islets, the larger forming Tabasco point, and the smaller one forming with the coast a narrow channel. From Rapado Grande pass the Colorados reef continues about NE. by E. $3\frac{1}{4}$ miles to the first or leeward of the Diego Cay passes. Two miles farther to the eastward is the second or windward pass of the same name. These two passages have a depth of $1\frac{3}{4}$ fathoms. The weather one lies $2\frac{1}{2}$ miles N. by W. and the lee one 2 miles NW. of Diego cay.

NE. $\frac{1}{2}$ E. 4 miles from the easternmost of the Diego Cay passes is Roncadora pass, with a width of 1 cable and a depth of 16 feet. To enter it, coast along the edge of the reef until the town of Bajás, on rising ground 2 miles inland, is in sight, then bringing the tower of the church on with the little hill of Acostas; this mark will lead through mid-channel with depths of from 16 to 26 feet after passing the reef. Roncadora pass.

From Tabasco point the coast is low and presents no remarkable features, trending E. $\frac{1}{4}$ N. $3\frac{1}{2}$ miles to the western point of Baja bay. Baja bay.

This bay is a secure anchorage, being only open to NW. winds. In this direction the reefs are at no great distance and prevent any heavy seas from rolling in. At the head of the bay there is a landing-place, serving as a port for the

* *The Anuario del Depósito Hidrográfico*, vol. viii, mentions a mud bank marked by beacons stretching off cay Diego, but says nothing of this reef.

town of Baja, about three miles inland. Vessels of light draught lie $\frac{1}{3}$ of a mile off the landing in 8 feet of water.

Alonzo Rojas
point.

N. by W. $\frac{1}{4}$ W. $2\frac{1}{2}$ miles from Baja bay is Alonzo Rojas point, formed by several small cays close to the shore. Immediately N. of this point the coast forms quite a large bay, then trending NE. $\frac{1}{2}$ E. for 7 miles to Jutias cay, forms several other smaller bays.

Jutias cay.

Jutias cay is about 3 miles long, swampy in the southern part, with drier land in the northern portion. The cay is separated from the mainland by a narrow channel only navigable for boats.

Nombre de
Dios bay.

Between the western point of Jutias cay and Jaguey point, 2 miles to the SW., is Nombre de Dios bay, the entrance to which is nearly closed by an extensive mud-bank. There are two channels of entrance to the bay, both marked out by beacons. One of these is within 1 cable of the shore of Jutias cay, and the other is 2 cables farther to the westward. Each of these channels is $\frac{1}{2}$ a cable wide and carries a depth of from 11 to 16 feet of water.

From the Roncadora pass the Colorados reef continues in an ENE. direction for 6 miles to Galera pass, the outside of the reef being about 5 miles off shore and its average breadth $1\frac{1}{3}$ miles.

Galera pass.

Galera pass lies 2 miles W. of Jutias cay, and is marked by a beacon of branches. The pass is rather more than 2 cables in width, with a depth of 13 feet, rocky bottom.

Jutias pass.

Jutias pass is formed by the reef to the eastward, and to the westward by a ledge of rocks almost awash, extending from the NE. point of Jutias cay.

This pass is divided into 2 channels by a shoal on which there is very little water. Temporary beacons, in the form of stakes, mark out the various channels.

From Jutias pass the reef trends NE. by E. 14 miles, then after forming an indentation of about 1 mile, continues E. $\frac{1}{4}$ N. 12 miles to Leviza Cay pass.

Between these two passes the outside of the reef is $3\frac{1}{2}$ miles off shore, and it has an average breadth of 1 mile, widening in places to $1\frac{1}{2}$ miles.

Albatross bank.

The Albatross bank is a small shoal with 9 fathoms of water on it, hard bottom. Its approximate position is in latitude $22^{\circ} 50' N.$, longitude $84^{\circ} 15' W.$, but as this does not agree

with the position by the bearings given, its exact position requires to be determined. This latitude and longitude would place it about 9 miles NW. $\frac{1}{4}$ W. of that part of the reef between Galera and Jutias passes. East of Jutias cay the coast forms a bay 2 miles wide, then taking a NE. by E. direction for 5 miles to Santa Lucia point, forming several small coves of no importance.

Coast-line.

Two miles NE. by E. of Santa Lucia point is the western point of Malas-aguas bay, the coast between forming several coves.

Malas-aguas bay is $2\frac{3}{4}$ miles wide and $1\frac{1}{2}$ miles deep.

Malas-aguas bay.

From the eastern point of Malas-aguas bay the coast runs SE. $\frac{3}{4}$ E. $1\frac{1}{2}$ miles to the river Pan de Azúcar. Half a mile within the mouth of this river good drinking-water, said to be the best on this part of the coast, can be obtained.

NNW. of the mouth of the Pan de Azúcar river, $1\frac{3}{4}$ miles distant, is Boquerones cay, half a mile long and separated from the eastern point of Malas-aguas bay by a channel 2 fathoms deep, but not navigable for a stranger, except with the assistance of a pilot, on account of the numerous reefs bordering its sides.

Boquerones cay.

Inez de Soto cay lies about three-fourths of a mile NE. by N. from Boquerones cay. It is 4 miles long NE. and S. W., and as seen from the northward appears to be divided by a narrow channel in two parts. This channel is, however, only a small inlet $1\frac{1}{2}$ cables in extent. The cay is represented on the charts, erroneously, as in two parts. The southern portion of the cay is swampy.

Off Gallegos point, the NW. point of the cay, 2 cables distant, is a mud-bank, 1 cable long E. and W. and $\frac{1}{2}$ a cable wide, with $5\frac{1}{2}$ feet of water on it. Between this bank and the reefs outside of it is a channel $2\frac{1}{2}$ miles wide and 2 fathoms deep, navigable for coasting-vessels.

The bay of San Cayetano lies between Inez de Soto cay and a small islet close in shore, called la Legua on the W., and Lavandera point on the Cuban shore on the E.

Bay of San Cayetano.

In the middle of the shore of the bay are several huts, a store-house for copper-ore, and a wooden wharf. In this bay the bottom is of mud and the anchorage is sheltered from E. to W. round by S.

In standing in for this anchorage care must be taken to

avoid a reef extending $\frac{1}{2}$ a mile to the SE. by E. from the eastern point of Inez de Soto cay.

The best berth is in 11 feet of water, with the eastern point of Inez de Soto cay bearing NW. $\frac{1}{2}$ N., and Lavandera point NNE. $\frac{1}{2}$ E.

Lavandera
point.

One and a half miles E. of the eastern point of Inez de Soto cay is Lavandera point, apparently on the main-land, but really the northern point of a cay, 3 miles long E. and W., separated from the Cuban shore by a narrow channel uniting San Cayetano and Berracos bays. The northern part of this cay is of dry land, but all the rest except a small beach on the western side is swampy and covered with mangroves.

East $\frac{1}{2}$ S. $1\frac{1}{2}$ miles from Lavandera point is a cluster of three small islets, swampy, and covered with mangrove-trees, called the Uvas cays.

Southeast $\frac{1}{2}$ S. $\frac{3}{4}$ of a mile from these cays is a point of land which, with the westernmost of the Berracos cays 2 miles to the NE., forms Berracos bay, $1\frac{1}{2}$ miles deep.

Uvas cays.

In this bay, S. of the largest and easternmost of the Uvas cays, is a small cay called Obispo.

Berracos cays.

The Berracos are two small, low cays, joined to the coast by a reef preventing the passage of boats and sheltering the anchorage of Berracos bay. The channel leading to this anchorage has a depth of from 9 to 16 feet, gradually diminishing toward the shore. This channel is situated between the easternmost of the Uvas cays and the westernmost of the Berracos cays.

Arenas cay.

Arenas cay lies 1 mile N. of the Berracos and is separated from the reefs outside by a channel from 2 to 3 cables in width, navigable for boats only. It is $\frac{1}{2}$ a mile long from E. to W. and its southern portion is swampy. There is a short reef extending from its SW. point.

From the Berracos cays the coast runs E. a little northerly for 1 mile, then trends ESE. for $1\frac{1}{3}$ miles to the mouth of the Rio del Medio.

From the mouth of the Rio del Medio the coast takes a NE. by E. $\frac{1}{2}$ E. course for 3 miles to Purgatorio point, forming in this interval two small bays of no importance.

The Dios cays are two small swampy islets lying NE. by E. $\frac{1}{4}$ E. $2\frac{1}{4}$ miles from point Purgatorio and very near the coast

North of these cays, 1 mile* distant, is Leviza cay. The channel between them, narrowed by a reef extending 2 cables from the S. side of the latter cay, has a depth of 8 to 11 feet of water over muddy bottom. Leviza cay.

Leviza cay is 3 miles long E. and W., and is divided in two by a narrow creek navigable for boats. Its southern part is swampy. Between the cay and the Colorados reefs, 1 mile outside, there is a channel fit only for small coasters.

Southeast by S. $\frac{1}{2}$ S., 2 miles from the eastern part of Leviza cay, is the mouth of the Puercos river, the water of which is not fit to drink.

East $\frac{3}{4}$ N. $2\frac{3}{4}$ miles from Leviza cay is Alacranes point, with several cays lying off it, called the Casiguas and Alacranes, very near the coast and separated by channels only passable by canoes. Alacranes point.

Alacranes cay lies a short distance eastward of the pass of the same name, is $2\frac{1}{2}$ miles long E. and W., and is separated from the outside reefs by the Reduan channel, 1 mile wide and 7 to 8 feet deep. The southern part of the cay is a mangrove-swamp, and is separated from the Cuban coast by a canoe-channel, $\frac{1}{2}$ a cable wide and 2 to 3 feet deep, leading to the Casigua cays.

The outer limit of the reef passes $1\frac{1}{2}$ miles to the northward of Leviza cay, after forming to the westward the pass of the same name, in which there is very little water, then continues E. by N. $\frac{3}{4}$ N. $4\frac{3}{4}$ miles to Alacranes pass, then trending ENE. 6 miles to Blanco Cay pass. Leviza pass.

The greatest depth of water in Alacranes pass is 8 feet. It is only used by small coasting vessels.

East of Alacranes point, 4 miles distant, is a small cay called Ratones, 2 miles ENE. of which is another small islet, called Blanco cay. Ratones and Blanco cays.

Southwest $1\frac{1}{4}$ miles from Blanco cay is Medio point and the mouth of Medio river. One mile farther to the S. is the bay and landing of Mulata.

Abreast of Blanco cay the coast runs NE. by E. for $7\frac{1}{2}$ miles to the river Manimani. From here the shore is moderately high and takes an E. $\frac{3}{4}$ N. direction for $3\frac{1}{4}$ miles to Gobernadora point, lying NW. by W. $\frac{1}{2}$ W. 2 miles from the entrance to the harbor of Bahia Honda.

It is proposed to establish a revolving light on Gobernadora point.

Blanco Cay
pass.

The least depth of water in Blanco Cay pass is 11 feet. Off the western part of Blanco cay there is anchorage in $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms of water; muddy bottom. From here the reef runs ENE. 5 miles to Manimar pass, navigable for vessels of 6 feet draught; then, trending NE. by E. $\frac{1}{2}$ E., its outside limit is about 1 mile from Gobernadora point. The reef terminates at Pescadores point, on the W. side of the entrance to Bahia Honda. Vessels of not more than 8 feet draught can navigate inside the Colorados reefs. The Alacranes pass is not safe when the weather is at all rough. The Galera pass is better.

In passing Diego and Rafado Grande cays care must be taken to avoid the shoals near them. Near the reefs are many detached coral heads and the bottom is rocky. Near the Cuban shore it is of mud and sand. Between the Colorados reefs and Cajon point vessels may easily leave or approach the channels inside the reef. Here the chart will be the best guide.

Port of Bahia
Honda.

The harbor of Bahia Honda is well sheltered and will admit vessels of any draught of water. The points forming the entrance as well as the sides of the channel are bordered with reefs and shoals, making the assistance of a pilot desirable to a stranger. The channel of entrance is 2 miles long N. and S. and the basin inside $1\frac{1}{2}$ miles in diameter.

Morrillo point on the eastern side of the entrance has a small hill upon it and is bordered by a reef extending $\frac{3}{4}$ of a mile to the NW. On its edge are 5 fathoms of water.

Off Pescadores point, on the western side of the entrance, the reef extends nearly $\frac{1}{2}$ a mile to the NE.

These two points are nearly abreast of each other, the channel between them being narrowed to $1\frac{1}{2}$ cables. Inside these outer points are two others, Real point on the E. and Cayman point on the W.

These points are also abreast of each other, and between them the channel is 2 cables wide, the bank off point Real extending only $\frac{2}{3}$ of a cable and off point Cayman only $\frac{1}{3}$ of a cable. Still farther in, the entrance to the harbor is terminated by two other points, the eastern one called Carenero and the western one Placer. A short distance S.

of Carenero point is Largo cay, the western extremity of which, called point Difuntos, can be seen from outside the port.

To enter the harbor, bring the entrance to bear S. and steer for it. When within the distance of 1 mile Difuntos point will be seen between the sandy points on either side of the entrance, and beyond it a remarkable hill, with a square top, back of a sugar-estate. By keeping the eastern end of this hill on with Difuntos point, a depth of 16 to 5 fathoms will be carried in. The eastern side of the entrance should be kept close aboard, and when abreast of Carenero point a vessel may anchor in 6 fathoms of water, or, if it is desired to proceed farther in, she may stand on to the SW. and anchor just within Difuntos and Mangles points. Placer point should be given a good berth, as a sand-shoal just awash lies $\frac{1}{4}$ of a mile off it.

Sailing-vessels must wait for the sea-breeze to enter, and for the land-breeze to leave, Bahia Honda.

Although several streams empty into the harbor, good water cannot be obtained in great quantity.

From Bahia Honda the coast runs a little northward of E. 12 miles to Cabañas. Between these two places the shore should not be approached nearer than 2 miles.

The harbor of Cabañas is a good and well-sheltered anchorage, and vessels of the largest draught may safely enter it.

South of the port, 5 miles inland, there is a range of mountains, 1,400 feet high at the western part, sloping gradually toward the eastward to a large plain extending as far as the table-land of Mariel. At the eastern end of the heights there is a remarkable peak bearing SE. from the entrance to the harbor, and about the middle of the range there is a remarkable gap.

On the eastern side of the entrance there are two small hills, on the western part of which are the buildings of a sugar-estate. The entrance is $1\frac{1}{4}$ miles wide, and when it bears S. a guard-house or tower with several adjacent buildings will be seen, 2 miles inside. This tower is on the extreme of an islet called Don Juan Tomas cay, which divides the harbor into two large arms. The eastern of these is

Puerto de Cabañas.

only fit for coasters, the western one affords anchorage for vessels of 15 feet draught.

The eastern shore of the entrance is bordered by a coral reef, extending off $\frac{3}{4}$ of a mile. Off the western shore a ledge extends $\frac{1}{4}$ of a mile, leaving the channel only $\frac{1}{4}$ of a mile wide.

Having opened the entrance to Puerto Cabañas, bring the tower to bear S. $\frac{3}{4}$ E., when it will be in line with the gap in the mountain above mentioned, and also in line with Pescadores point inside the harbor. This course will lead toward the entrance, with depths of 16, 12, and 9 fathoms, sandy bottom. When the first point on the western side, called point Arbalatos, bears W. $\frac{1}{4}$ N., the vessel will be in the mouth of the entrance in 7 or 8 fathoms of water. Then steer SE. $\frac{1}{2}$ S. till point Pescadores, the western inner point, bears S., then a course S. $\frac{1}{2}$ W., with a depth of 5 fathoms, will lead between the banks of rock and sand till the water deepens to 13 fathoms.

With the gap open a little to the eastward of the tower a vessel will carry in 22 feet water; and with it open to the westward double the breadth of the tower, she will have 20 feet.

Having passed the inner point on the W. side of the channel, haul up and anchor close under the weather-shore in 8 or 9 fathoms, mud, near the entrance of the SE. arm; or keep away and come to in the SW. arm, under the lee of the tower. In doing this, however, be careful to avoid a patch of rocks and sand, which extends a cable N. and S., and on which there are $2\frac{1}{3}$ fathoms water; it lies nearly $\frac{1}{2}$ a mile N. by W. from the tower, and may be seen from aloft.

In leaving the harbor it will be desirable for a sailing-vessel to weigh with the early land-wind, to insure its carrying the vessel well out before it fails, as there is generally a very heavy swell in the offing, and frequently a strong SW. eddy, which might set her on the reef skirting the shore.

In Puerto Cabañas fresh water cannot be obtained in great quantity. Wood may be had, and fish are very abundant. Between Puerto Cabañas and Puerto del Mariel, 12 miles to the eastward, the coast is, in places, bordered by a reef $\frac{1}{2}$ a mile off shore. The edge of the reef is steep to, and,

as there is frequently a strong eddy setting to the SW. vessels must take care not to get becalmed in this vicinity.

Puerto del Mariel is about 12 miles to windward of Ca-
bañas, and 22 miles to leeward of Havana. The shore in
its vicinity becomes a little more elevated, and a short dis-
tance inland, to the eastward of the port, there is a remark-
able long flat ridge of table land, of moderate height, with
a notch or step at its east end, called the Table of Mariel,
which cannot be mistaken, and a little westward of it will
be seen a remarkable cliff, facing westward in the harbor.
The entrance lies NW. from the W. end of the Table, and
on its eastern side there is a martello tower and some huts,
and when the former bears S. by E. a church and several
buildings will open out in the interior.

Puerto del
Mariel.

The port is nearly 3 miles deep N. and S. and well shel-
tered, but its entrance is only 50 yards wide. The least
depth is 4 fathoms. The eye will be the best guide in en-
tering, and when within the narrowest part keep the
weather shore aboard until abreast of Gorda point on the
west shore, on which there is a small fort, when the vessel
may anchor in 5 or 6 fathoms in safety.

The shore eastward of the Table of Mariel, which is steep-
to, becomes rather low and flat until within a mile or two
of Havana, when it rises into a few small fortified hills.

The shore is composed of dark-colored bluffs, clear of
danger and steep-to. Between Mariel and Havana are the
mouths of the small rivers Mosquito, Guajaibon, Banes,
Barracoa, and Banta. Abreast the mouth of the river
Jaimanita, 9 miles W. of Havana, a reef extends 1 mile off
Mangles point.

Four miles W. of the entrance to Havana is the little
basin of Chorrera, at the mouth of the Almendaraz river.
It is quite open to the northward and has no bar or other
obstruction at its entrance. The anchorage in 3 to 5 fath-
oms would scarcely accommodate half a dozen vessels, and
the holding-ground is only coral sand. At this place the
end of one of the telegraph-cables between Cuba and Key
West is landed.

Harbor of
Chorrera.

The rather low coast in the vicinity of the entrance to
Chorrera is very ragged, the blackened coral rock being
honey-combed by the sea.

Havana.

The entrance to the port of Havana may be easily recognized by the Morro Castle and light-house, with the extensive line of fortifications on the eastern side of the entrance. The land to the eastward of the city, until near the Jaruco or Iron mountains, 18 miles distant, is about 200 feet high and the shore bold and steep-to.

The entrance to the harbor lies about NW. by W. and SE. by E. The channel for about half a mile is not more than 1 cable wide, farther in it widens, opening into a basin of irregular shape $2\frac{1}{4}$ miles long NE. and SW. and from a half to 1 mile wide.

The Morro point is steep-to and vessels of large draught may pass close to it. Soundings extend off NW. by N. from the point half a mile. The northern shore of the channel is bordered by the Cabrestante bank which, at the outer part, extends off more than half a cable.

Both sides of the channel are marked by buoys, which are, however, frequently out of place. All the buoys can be used in good weather for warping except that planted on the Apostles' shoal on the N. edge of the channel. Men-of-war can generally, by applying to the captain of the port, obtain a mooring-buoy to lie at.

Within the harbor the western shore is bold and vessels lie alongside the wharves. The arsenal is in the SW. angle of the harbor.

In the northern part of the harbor is an iron floating-dock belonging to a company. It is 300 feet long and 80 feet wide, and is capable of taking up vessels of heavy tonnage.

A light-house, 79 feet high, stands on the Morro Castle, at the NE. side of the entrance of Havana harbor, and exhibits a *fixed white* light, varied by a *flash* every *half-minute*. The light is elevated 144 feet above high water, and is visible in clear weather at a distance of 21 miles.

It is extinguished for 10 minutes after midnight each night for trimming and cleaning the lamps.

Pilots.

Pilots are always in readiness to board vessels close off the Morro from sunrise to sunset on the usual signal being made.

Water.

Water is brought alongside by government water-boats if desired. It is not good after a heavy rain.

As there is but little ebb and flow of the tide in Havana harbor, the water is exceeding filthy from the sewage of the city and should not be used for washing decks or clothes. As a sanitary precaution, it is advisable to anchor as far from the southern bight of the harbor as possible.

It is high water, full and change, in Havana harbor at 8^h 14^m, and the greatest rise is about 2½ feet. There is no regular ebb and flow, but with the land-breeze a slight current usually runs out. Tides.

Vessels bound to Havana from the westward, having rounded cape San Antonio, with the usual trade-wind at E., should not steer higher than N. for 15 miles, when they may haul to the wind, and the chart must be their guide along the Colorados. Here, however, the current generally sets to the SW. on the edge of the bank. It will therefore be better to stand to the northward, as far at least as the parallel of 24°, before tacking.

Nothing is more uncertain than the point where the great Florida stream is first met with; sometimes it will be found 50 miles to the SW. of the Tortugas islands; and at others it will not be felt until close up to the W. end of Tortugas bank, or 30 or 40 miles S. of those islands; the vessel's position by chronometer should therefore be ascertained as frequently as possible. Under any circumstances it will be better to avoid the Cuba shore until the vessel is well to the eastward, when it may be necessary to sight the high lands in order to check the reckoning. In approaching the Cuba shore, the easterly stream will seldom be met with until nearly on the meridian of Havana, or on the line between there and the Tortugas. It generally runs at the rate of from 2 to 3 knots close off the mouth of the harbor, and from thence in a NE. direction right across the Florida strait. Gulf stream.

It frequently happens that having arrived at a position S. of the Tortugas without feeling the influence of the stream, it is perhaps entered soon after the reckoning has been checked in the evening, and in making the land on the following morning the vessel will be found far to windward of the port. The features of the land to the eastward, however, differ so considerably from those to the westward, that there will be no difficulty in making out the position. The land eastward of the Morro is about 200 feet high and rather flat,

but about 18 miles to windward it rises into a remarkable ridge of irregular hills of moderate height, about 3 miles in length E. and W., and a short distance from the shore, called the Jaruco or Iron hills; whilst at 18 miles westward of the Morro is the Mesa del Mariel, and farther on in the same direction the hill of Cabañas.

About 13 miles eastward of the Jaruco mountains and 7 miles S. of Guanos point is the Pan de Matanzas, a large mountain 1,277 feet high, which can be seen from a distance of 36 to 40 miles. When seen from the NW. its summit forms three hummocks, the centre one being much the highest, rising from behind a flat rocky ridge of land of moderate elevation. From the NE. it appears as a prominent rounded mountain standing out by itself, and becomes a valuable point of departure. Should the vessel be found in a position thus far to windward, or less, it will be better to stand in and run down within about 2 miles of the shore to avoid the current; taking care, however, to steer clear of the Jaruco bank, on which there are only 11 feet water, and which lies about $1\frac{1}{2}$ miles from the shore, midway between Havana and Guanos point, off the Iron hills. The discolored water on this bank, which is of some extent, may be seen from aloft in clear weather, and soundings appear to extend for a short distance all along the shore.

Nine miles S. of the Morro there is a remarkable isolated hill 732 feet high, with two round hummocks, called the Tetas de Managua or Managua paps. This hill is not only an excellent guide for Havana when coming from the northward, but useful also as a point of departure.

Cape Maysi.

The northern coast of Cuba from cape Maysi, the eastern extremity of the island, runs N. by W. nearly 2 miles to a small cove called Hembra bay, where the light-house stands.

Light.

A *fixed white* light, at an elevation of 128 feet above the sea, is exhibited from a round light-tower having an octagonal base. The tower, with the keeper's dwelling adjoining, stands about 50 yards inshore.

The light should be seen, in clear weather, from a distance of 17 miles.

Between Mangle point, lying 700 yards N. of the light-house, and Estaca point, 600 yards beyond it, the coast forms a deep bight, into which the river Maysi empties during the rainy season. From Estaca point the coast runs NW. by N. 1 mile to Azules point, then short distances, alternately of soboruco and small sandy beaches, for $1\frac{1}{2}$ miles to the Canto de los Azules, which terminates the headland of cape Maysi.

From the Canto de los Azules, the coast, with the exception of three small sandy beaches, is of soboruco as far as a somewhat salient point called de los Puertos, on account of inlets in its vicinity, thence to a more prominent point called Rasita.

Maysi reef.

The coast, between Pintado and Azules points, is bordered by a reef ranging from $1\frac{1}{2}$ to $2\frac{1}{2}$ cables off shore. This reef is just awash, the sea breaking constantly upon it. There are several openings through it, navigable for very small vessels. That leading into Mangle bay can almost always be used, but with a fresh breeze the others are unsafe.

The Mangle bay opening is 130 yards wide and 7 fathoms deep. A sunken rock, with 6 feet of water on it, lies on the S. side of the passage.

Maysi bank.

Outside the Maysi reef there is a rocky bank, with about 9 fathoms water on it at the distance of $2\frac{1}{2}$ to $3\frac{1}{2}$ cables, and at a mile from it there are from 73 to 90 fathoms, sand, gravel, and rock. Cape Maysi is 6 cables eastward of the meridian of the light house, and nearly 2 miles S. by E. of it, and where the reef is most dangerous during the night.

Vessels from the northward, bound to the southern coast, should be careful to steer sufficiently eastward to clear the reef; and in rounding the cape from the southward, the light should be brought well westward before steering northward.

Near the land off cape Maysi the flood runs westward, and the ebb eastward. During the summer months, with southerly winds, easterly currents will be experienced, and with northerly winds southerly currents.

From Azules point proceeding westward the coast commences to increase in height, and takes a WNW. course for 5 miles to Fraile point.

From Rasita point to Baga point, which juts out a little and may be known by three large rocks near it, the coast is of soboruco and forms a bay.

From Baga point the coast takes a general W. by S. course for 2 miles to Silencio point, is mostly of soboruco, and is steep-to and clear of danger. There is no bottom with 90 fathoms $\frac{1}{2}$ a mile off shore.

From near the mouth of the river Yumuri a high range of mountains runs along the coast to the eastward, diminishing in height near Baga point, and ending a short distance S. of it.

The river Yumuri runs through a deep ravine in the mountains, emptying into the sea nearly $\frac{1}{2}$ a mile to the westward of Silencio point. From this point to the entrance of Puerto Mata, $4\frac{1}{2}$ miles to the westward, the shore is foul, a reef, broken in places, skirting it at from 1 to 2 cables off shore. There is anchorage in 11 fathoms of water, with a bottom of sand and mud, just W. of Silencio point. The anchorage is open to the northward and is full of dangers.

Yumuri anchorage.

Mata harbor. The harbor of Mata is a small basin $\frac{1}{2}$ a mile in diameter, only fit, from its limited size and shallow water, for small vessels.

The banks which border the shores leave only a space $1\frac{1}{2}$ cables in diameter in the middle of the harbor having a depth of 15 feet.

The entrance is open to the NE., and in the winter months a heavy swell sets into the entrance.

A bank borders each side of the entrance, and a vessel in entering has only to keep in mid-channel, carrying a depth of 4 to 6 fathoms.

Several small streams of good water empty into the harbor and wood is plenty. Fresh provisions may be obtained from the people in the neighborhood.

It is high water, full and change, at Mata at 6^h 49^m, and the tide rises and falls about $2\frac{1}{2}$ feet.

From Puerto de Mata the coast, slightly concave, takes a NW. by W. direction for $1\frac{1}{2}$ miles to the entrance to the

Puerto de Boma.

Puerto de Boma. This harbor is only the mouth of the river of the same name, forming an inlet $\frac{3}{4}$ of a mile long and hardly 1 cable wide. The shore at the entrance is of rock, but farther in it becomes a mangrove-swamp. In the middle of the entrance there are $5\frac{1}{2}$ fathoms of water, sandy bottom, diminishing to 2 fathoms $\frac{1}{4}$ of a mile inside. The harbor is only

fit for coasters seeking temporary anchorage or to load with the products of the neighboring farms. It is open to the northward and fresh breezes cause a heavy sea to roll in.

From the Puerto de Boma the coast, forming a few slight indentations, takes a NW. $\frac{1}{4}$ N. course for $2\frac{1}{2}$ miles, and is composed of soboruco as far as Mejana point, near which are two large rocks.

From Mejana point the coast trends westward for 1 mile to Rama point; then, forming a rounded headland, turns southward to the mouth of the river Miel. Here a sandy beach, called the Playa de Miel, begins, continuing 1 mile in a westerly direction.

At its western end the rocky coast again commences, running nearly NW. by W. $\frac{3}{4}$ of a mile to Doña Dolores point, then, turning more westerly, to the weather-point of the entrance to Puerto Baracoa, called Barlovento point. This point with point Rama form the entrance to a bay $\frac{3}{4}$ of a mile wide, somewhat sheltered from the trade-wind. At the head of the bay is the Playa de Miel mentioned above. To reach this anchorage, being about $\frac{1}{2}$ a mile W. of point Rama, steer to the southward till the mouth of the river Miel bears about SE. by E. $\frac{1}{4}$ E., then anchor in 5 or 6 fathoms of water, with a bottom of black sand, about 2 cables from the rocky coast to windward, and the same distance from the beach. This is the best berth. The anchorage is exposed to northerly winds.

Water may be obtained from the river Miel.

Puerto de Baracoa may be readily found by the Yunque de Baracoa or Anvil, a flat-topped mountain, which rises above the neighboring heights westward of it. The entrance of the port is $1\frac{1}{2}$ cables wide, and within it opens out to 6 cables in a NW. and SE. direction, and 3 cables in breadth, but its shores are bordered by a sand-bank, which considerably contracts the anchorage. At about 35 yards to the NW. of the inner point on the SE. side of the entrance, is an isolated rock called the Buren, which uncovers at low tide; the sea always breaks on it, it is steep-to, and the only danger.

There are from 5 to 6 fathoms water in the port, but it is exposed to the prevailing winds, which throw in a heavy sea, Vessels generally anchor close up to town in $3\frac{3}{4}$ to 5 fathoms

Anchorage of
Playa de Miel.

Puerto de Bar-
acoa.

water, mud and sand. It can only be left, except in a small vessel, with the land-wind; consequently, in the season of the northers, a sailing-vessel will be liable to some days' detention. The bottom in general is loose, and during fresh northerly winds the port offers but little shelter.

From March to September squalls from S. to SW. are experienced, but the most violent are in July and August. These squalls are of short duration, but a vessel should ride by a fair scope of cable. Remittent fever is at times prevalent at Baracoa, and the place should be avoided during the summer months.

Light.

From an iron column on the S. side of the entrance a *fixed white* light is exhibited at a height of 48 feet above high water. The light should be seen in clear weather from a distance of 12 miles.

Supplies.

Near the pier at Baracoa the river Macaguanigua runs into the sea, where water may be obtained. Fresh meat is not easily procured. Large quantities of fruit are exported to the Bahamas and United States.

Tides.

It is high water, full and change, at Baracoa at 7^h 23^m, and the range of tide is about 2 feet.

The coast all along between the ports of Mata and Baracoa is backed by high land very near it; the Monte de Majayara, the most remarkable eastward of the Playa de Miel, is 530 feet high, and seen at a distance of 24 miles. The two hills of Santa Teresa rise southward of the mouth of the Rio de Miel; the eastern one is 687 feet high, and is seen 30 miles off; the western one is 487 feet high, and seen 24 miles off.

Between Mata and Boma, at 6 cables from the shore, the soundings are from 28 to 64 fathoms, mud, sand, gravel, or rock; but at a little more than a mile off the depth is more than 92 fathoms. From Boma to Rama point and off the coast of Baracoa there is no bottom with 92 fathoms, at 4 cables from the land, nor at Majana point at the distance of 11½ cables. From Port Mata a reef skirts the shore westward for 4 cables, at 11½ cables off, on which the sea breaks; thence the coast as far as Baracoa is clear of danger. All this part of the coast, from Cape Maysi to Baracoa, is exposed during the winter months to the N. and NE. winds,

Winds and current.

which prevail at this season. During the summer, squalls off the land are experienced. The land winds are regular, and spring up fresh generally at daylight, but do not extend far from the coast.

The direction of the current to a short distance from the land is westward with the flood tide and eastward with the ebb.

Nearly 4 miles about W. by S. from the entrance to Baracoa a remarkable isolated steep and flat-topped mountain, called the Yunque de Baracoa, rises to 1,852 feet above the sea, and may be seen at a distance of 40 miles. It is partly covered with vegetation, and there are some white and red spots in the break or opening in the rock of which it is composed visible at some distance. It is a most useful landmark, and its shape, resembling an anvil, prevents its being mistaken for any other mountain.

From Puerto de Baracoa to Puerto de Maravi the shore is clear of danger, and is formed partly of soboruco cliffs and partly by a sandy beach. As this part of the coast is directly exposed to the wind and sea, a good berth had better be given it.

Eastward of Puerto de Maravi, at $\frac{1}{2}$ a mile distance, is a little indentation of the coast called port Ligua, which can only be used by very small vessels and only in fine weather.

Puerto de Maravi is 3 cables in length in a NE. and SW. direction, $1\frac{1}{2}$ cables in breadth, and its entrance 1 cable across; its shores are of soboruco, but on the W. there are three small sandy beaches. At the head of the port the land is marshy, with mangroves, and here the river of the same name empties. A bank of sand, gravel, and rock borders the shore, contracting the entrance to about 50 yards, and the anchorage to less than $\frac{3}{4}$ of a cable in breadth. Therefore, although the water is deep, there being from 9 to 15 fathoms, mud and rock, the port is only fit for small vessels, and in entering the eye will be the best guide. A sailing-vessel should leave with the land wind in the morning. This port is, however, exposed to the NE., and not a safe anchorage except under favorable circumstances.

Water may be had from the river, but it is very shallow

in the vicinity of its mouth and dry at low tide. Wood and small supplies of provisions may be obtained.

It is high water, full and change, at Puerto de Maravi at 7^h 56^m; and the range of tide is about $2\frac{1}{4}$ feet.

Port Aguacate. The port of Aguacate, $\frac{1}{4}$ of a mile to the westward of Port Maravi, is only a small inlet, capable of admitting very small coasters.

Port Cueva. The port of Cueva, $\frac{3}{4}$ of a mile farther to the westward, is similar but a little larger. Immediately after port Cueva is Ensenada de Bay, and then for nearly half a mile the coast is low and rocky, terminating in Bay point, which is rather low and almost separated from the coast, having on its lee side an inlet fit for boats. This point is often named Vaez, but the pilots and seamen of the coasters call it Bay. All this part of the coast is thickly wooded, and a short distance inshore the land is high. Among the heights is a mountain called the Silla de Bay, having a saddle-shaped summit, formed by two peaks. This mountain lies $2\frac{3}{4}$ miles SW. by W. $\frac{1}{2}$ W. from Bay or Vaez point, is about 1,400 feet high, and can be seen at a distance of 42 miles.

The coast from Baracoa to Bay point is also backed by high land covered with vegetation to very near the shore. Between Baracoa and Duaba point the mount or hill of Jaitecico rises about three cables inland, is about $\frac{1}{2}$ a mile in extent, of little elevation, covered with trees, and is useful in recognizing the port of Baracoa. There are 92 fathoms of water at about $\frac{1}{2}$ a mile from the coast, and 13 to 23 fathoms, sand and rock, at 2 cables from it, except off the beaches of Duaba and Toar, where there are 92 fathoms at the distance of $\frac{3}{4}$ of a mile, and 14 to 46 fathoms at $\frac{1}{2}$ a mile.

From Bay point the coast takes a NW. by W. direction for $7\frac{1}{2}$ miles to Jaragua point.

Naguarage bay. About 1 mile to the westward of Bay point is the small bay of Naguarage, only fit for boats, and into which the river of the same name empties. Farther to the NW. at the distance of 1 mile from this small bay is the small harbor of Puerto de Navas. This locality is easily recognized by salient point called Plata, half way from Naguarage bay to Puerto Navas. On the weather side of point Plata is a small white beach surmounted by a soboruco cliff.

Puerto de Navas is a small harbor, shaped like a horse-shoe, and about 400 yards in diameter. It is open to the N., but well sheltered from the prevailing NE. winds. The depth varies from 11 fathoms at the entrance, to $5\frac{1}{2}$ and 4 fathoms inside the harbor. With the assistance of the chart it is perfectly easy to enter and depart from.

Puerto de Navas.

From Puerto de Navas the coast, here called Cayo Santo, runs for $\frac{3}{4}$ of a mile to the NW., to the entrance of Puerto de Cayaguanique, only fit for small coasters, and the entrance to which is less than 20 fathoms wide. From Puerto de Cayaguanique the coast, as far as Mapurisi point, a distance of $\frac{3}{4}$ of a mile, is of rock. On the weather side of Mapurisi point there are two small, sandy coves, and to leeward of it the coast continues for rather more than 1 mile, of rock, with five small sandy coves and a small inlet called Puerto Seguro, as far as Nibujon point. Here the beach of the same name $\frac{1}{4}$ of a mile long commences. At its western end the river Nibujon empties into the sea. From the mouth of the river to the entrance of the port of Taco, a distance of nearly $1\frac{1}{2}$ miles, the coast is partly of rock and partly a sandy beach.

Cayaguanique.

Puerto de Taco is an irregularly-shaped harbor about $\frac{3}{4}$ of a mile long N. and S., $\frac{1}{2}$ a mile wide, and having a very narrow and crooked entrance.

Puerto de Taco

The anchorage is well sheltered, but limited in extent, the space outside of the 2-fathom line being only $\frac{1}{4}$ of a mile in diameter. Although at the anchorage, and in places in the channel, there are from 6 to 7 fathoms, it should not be attempted, except in case of emergency, by vessels drawing more than 11 or 12 feet, as the points of the banks on either side of the entrance project so as to make the turns very short and are not easily seen.

To enter the harbor of Taco a pilot should be taken, but if one cannot be obtained the following directions may be of assistance.

Bring the outside leeward point of entrance to bear W. by S. $\frac{1}{4}$ of a mile distant, and then steer SW. by W. $\frac{1}{2}$ W. for the inner leeward point, which is high, bluff, and prominent. Skirting this bluff point, at the distance of about 150 yards, steer about SW. by S. to the anchorage, about

$1\frac{1}{2}$ cables beyond the inner point. Here a depth of $6\frac{1}{2}$ fathoms, muddy bottom, will be found.

These instructions are not to be implicitly relied upon. The last published survey of this port was made in 1825. Supplies. Wood, water, and a limited supply of provisions may be Tides. obtained. It is high water, full and change, at 8^h 49^m, the tide rising and falling about $2\frac{1}{2}$ feet.

From Puerto de Taco to Jaragua point, 1 mile distant, the coast, formed partly of soboruco and partly by a sandy Jaragua reef. beach, is skirted by the Jaragua reef, about 150 yards wide. Maguana reef. Neither this reef nor the Maguana reef, lying off shore between Vaez or Bay point and Puerto de Navas, is shown on the English Admiralty charts or on those of the United States Hydrographic Office.

Maguana reef commences $1\frac{1}{2}$ cables to the westward of Bay point and terminates half-way between Naguarage bay and Plata point. It is of unequal width, being widest abreast of the leeward point of the mouth of the Naguarage river, where it is about $\frac{1}{4}$ of a mile wide.

There are two openings through this reef; the eastern one is only fit for boats or very small vessels, and should not be attempted at all when the sea is rough. The western one is 50 yards wide in its narrowest part, and through it a depth of from $4\frac{1}{2}$ to 9 fathoms may be carried into the small but sheltered anchorage inside the reef. The entrance to this opening is $\frac{1}{4}$ of a mile N. by E. $\frac{3}{4}$ E. from the eastern point of Naguarage bay. The eye will be the best guide to enter it, and inside small vessels may anchor in from 1 to 2 fathoms, sandy bottom. Maguana anchorage.

The shore between Bay and Jaragua points is very bold, there being more than 90 fathoms of water at $\frac{3}{4}$ of a mile off shore; 4 cables off shore there are from 14 to 30 fathoms, with a bottom of sand, gravel, or rock. Off Mapurisi point, at a distance of 4 cables, there are 10 fathoms of water, Jaragua anchorage and reef. rocky bottom. From Jaragua point a reef extends to the NW. a distance of 2 miles.

A break in this reef, about $\frac{1}{2}$ a mile NW. of the point, affords an entrance to a small anchorage where small vessels may lie under shelter of the reef. This break or opening is about 200 feet wide, and its edges on both sides are marked

by breakers. Just inside the reef, abreast of the opening, are three small islets.

To enter the anchorage, coast along outside of the reef till the eastern point of the southern and largest of these three islets bears SE. $\frac{1}{2}$ E. Then steer for this point, and anchor according to the vessel's draught of water.

Abreast of the middle islet there are $5\frac{1}{2}$ fathoms of water, decreasing farther in.

From Jaragua point to Guarico point, 7 miles distant, the coast trends irregularly to the WNW. and then N., forming a large bay called Cañete, the shores of which are entirely exposed to wind and sea and are skirted by a reef which starts from Jaragua point and extends 2 miles seaward from the low and sandy point of Guarico.

Guarico point.

The river Yamanigüey empties at the head of Cañete bay.

Mangles point is 1 mile W. of Guarico point.

This vicinity should be avoided, and when near it the latitude should be frequently and carefully ascertained, especially at night, as a strong indraught is said to have caused many disasters.

The coast from Guarico point trends WNW. 9 miles to the mouth of the Moa river and is skirted by a reef extending from 2 to 3 miles off shore.

The river Moa, one of the largest in the island, has a fall of more than 300 feet a short distance from the mouth. The entrance is shallow and only 30 yards wide, but the river deepens inside. About 12 miles inland are some mountains called the Sierras de Moa, which are good landmarks.

The anchorage, called the Puerto de Cayo Moa, lies between the reef and the Cuban shore, and is protected on its northern side by a group of small islands nearly joined called Cayos de Moa. The anchorage is about 1 mile long E. and W. and half a mile wide, and is approached through an opening called the Quebrado de Moa, about 600 yards wide in its narrowest part and having a depth of 21 to 24 fathoms, sandy bottom.

Puerto de Cayo Moa.

Punta Gorda, a small bluff from which a hill slopes inland, lies SSE. $2\frac{3}{4}$ miles from this opening.

NW. by W. $\frac{3}{4}$ of a mile from Punta Gorda is a similar bluff called Punta Yagrumaje, the coast between them form-

ing a small bay, called the Ensenada de Yagrumaje, at the head of which empties the small river of the same name, not navigable even for boats. From Punta Yagrumaje to the mouth of the river Moa the coast, partly of sandy beach and partly of mangrove-swamp, trends W. by N. for half a mile, then turns sharply to the northward for about the same distance to the Punta del Rio Moa, where there is a fishermen's hut.

Rio de Yagrumaje.

The mouth of the river is close to this point and is 160 yards wide. At high tide the bar at its mouth may be passed by boats, and it is navigable for them for 1 or 2 miles inland.

River Moa.

From the mouth of the river Moa to Punta Yaguasey $1\frac{1}{2}$ miles to the westward the coast is low and formed by sandy beaches alternating with mangrove-swamps through which the creeks or esteros of Fabrica and Yaguasey empty. Another creek empties at Yaguasey point, which is low, and from which the coast, also low and covered with mangroves, trends WSW. for $1\frac{1}{3}$ miles to the mouth of the Estero de Moa, where there are three or four fishermen's huts, the remains of a former settlement.

From the Estero de Moa the coast trends NW. $\frac{1}{2}$ W. for 2 miles to Cabañas or Cavagan point, is low and sandy, with a few rocky bluffs, and $\frac{3}{4}$ of a mile from Estero de Moa is a spot where good water may be obtained.

The bay between Yaguasey and Cabañas points is called the Ensenada de Moa.

Cayos de Moa.

Two islets, called the Cayos de Moa, lie just inside the reef 1 mile westward of the opening. The larger one of the two is $1\frac{1}{2}$ miles long, from $\frac{1}{4}$ to $\frac{1}{3}$ of a mile wide, of rectangular shape, and has a projecting point at its SE. angle. The smaller cay lies NW. of the larger, from which it is separated by a narrow creek, is $\frac{1}{4}$ of a mile in diameter, and both cays are low and covered with mangroves.

Just within the opening in the reef and on a line between it and the mouth of the river Moa is a bank of sand and rock called the Bajo Grande, about $\frac{1}{4}$ of a mile in diameter, from the northern edge of which the southern extreme of Cayo Grande de Moa bears E. by N. $\frac{1}{2}$ N. In some places on this shoal there are less than 2 fathoms of water. One mile W. of the Bajo Grande and $\frac{1}{2}$ a mile S. of Cayo Grande de Moa is another shoal, of small extent, called the Yaguasey

shoal, the least water on which is 9 feet. Another small shoal spot $\frac{1}{4}$ of a mile farther to the northward, called Palancos shoal, is generally marked by a stake.

The eastern or weather reef at the entrance to this anchorage is distinctly marked, even in fine weather, by broken water, and the rocks are rather above water than awash. But on the lee or western side of entrance there is nothing to mark the danger for at least 6 cables from the eastern reef. The general body of the shoal extending from Cayo Moa is coral covered with dark weed, which, even with 9 feet water over it, looks deep; but the SE. end of it is white sand and the bottom can be seen. In standing for this anchorage bring the mouth of the Rio de Moa to bear S. by W., on which bearing the opening in the reef will present a fair channel-way and the eastern side of the reef be easily distinguished. Or, coast along the weather-reef from the eastward, keeping off about $\frac{1}{2}$ a cable or less, if necessary, as 7 to 9 fathoms will be found 30 yards off.

The course through the opening is S. by W., keeping near the weather side. As soon as the SE. point of Cayo Moa, called Pajaros point, bears W. $\frac{3}{4}$ N. steer W. by S. $\frac{3}{4}$ S., leaving the Bajo Grande on the port hand, till the mouth of the Rio Moa bears S. by E. $\frac{3}{4}$ E., then haul up a little more to the westward and anchor in from 11 to 12 fathoms, muddy bottom, with Pajaros point bearing about NW. by N. $\frac{1}{2}$ a mile distant.

It is high water, full and change, at Puerto de Cayo Moa at 8^h 9^m. The tide rises and falls about $2\frac{1}{2}$ feet. At the eastern end of Cayo Moa the flood sets to the SW. about 1 mile an hour, and the flood to the northward.

From Cayo Moa the coast trends westward for 11 miles to the port of Yaguaneque. The shore is low and skirted by a reef at from 2 to 3 miles off shore. Between the reef and the coast are two islets, the easternmost called Burro cay, lying on the outer edge of the reef and 7 miles W. of Cayo Moa. The other, Arenas cay, lies 3 miles farther to the westward and within $\frac{1}{4}$ of a mile of the shore.

Puerto de Yaguaneque.

The harbor of Yaguaneque is only fit for very small vessels, being small and shallow. Its entrance is through an opening in the reef, narrow and intricate. To enter the harbor, the best way is to coast along the reef from the

eastward till abreast of the opening in the reef, which bears $\frac{3}{4}$ of a mile NW. of Arenas cay. Then steer to the southward, keeping close to the edge of the eastern reef. The chart will be the best guide.

Puerto de Cananova.

Puerto de Cananova, $1\frac{1}{2}$ miles westward of Yaguaneque, is a small narrow inlet of similar character, and is entered through an intricate opening in the reef N. of it, which is here only half a mile from the shore.

Puerto de Ceballas.

Puerto de Ceballas, 4 miles farther westward, is equally difficult of access, and only fit for coasters. The shore is low and sandy, and the reef about half a mile distant.

Puerto de Tánamo.

From Ceballas the low sandy shore continues westward 11 miles to port Tánamo, and is foul to the distance of a mile. Midway between is the mouth of the river Sagua. This port is of considerable extent, and studded with small islets, between which are channels deep enough for the largest vessels. The cut through the reef and the channel into the port are, however, both very narrow; but the dangers are easily seen, and the eye will be the best guide.

Puertos de Cabonico and Livisa.

From port Tánamo a low sandy shore, still bordered by a reef to the distance of about 2 miles, trends westerly for 11 miles to the entrance of the ports of Cabonico and Livisa. These ports are entered through a narrow deep channel about a cable wide. At about half a mile within the entrance a narrow neck of land divides the interior into two channels; the easternmost leading into Cabonico, the other into Livisa. Both are very crooked and intricate, but have sufficient water for vessels of the largest draught. Most of the dangers are visible, and by referring to the chart the eye will guide in mid-channel.

The locality of the entrance to ports Cabonico and Livisa may be recognized by the Christal mountains, of which the highest peak is directly S. of the entrance, 13 miles inland.

From the entrance of these ports to Puerto de Nipe, 6 miles WNW., the shore is low and skirted by a reef which extends 1 mile off till close to Nipe, where the outer edge is only $\frac{1}{4}$ of a mile off shore.

Puerto de Nipe.

Port Nipe is about 8 miles in extent E. and W., and from 3 to 7 miles in breadth. It is quite secure against all winds, and will admit vessels of the largest draught without difficulty. The entrance is from $\frac{1}{4}$ to $\frac{3}{4}$ of a mile wide, and all

that is necessary in entering is to keep in mid-channel. After passing the inner points of the entrance keep the northern shore aboard for about 1 mile, till within Mangle point, from which a shoal extends to the NNE. $\frac{3}{4}$ of a mile, when anchor as most convenient, in 6 or 7 fathoms water.

It is perfectly easy to enter with the prevailing wind, but more difficult for a sailing-vessel to leave, as she must wait for the land-wind, which is sometimes interrupted for some days at a time.

The land in this neighborhood is remarkable. At about 10 miles inland the Sierras del Christal, a continuation of the Baracoa chain, rise to a great height. To the NW. of port Nipe there is also a lofty ridge of mountains rising from the shore at Mulas point to the Pan de Sama, a hill of rounded form, 885 feet above the sea, with some long table-land close to the westward, and a peaked hill to the E. of it. It cannot well be mistaken, and may be seen at a distance of 20 miles. The two ranges are separated by an extensive valley, which also serves as a good guide.

Pan de Sama.

From Puerto de Nipe to Puerto de Banes the coast is clear and steep-to. The shore is composed of beaches, interrupted by rocky points, and can be safely approached within $\frac{1}{2}$ a mile. The entrance to Puerto de Banes is open to the eastward, and is situated at the head of a bay lying between Point Cañones on the N. and point Palmas on the S., 2 miles apart. The shores of the bay gradually approach toward the entrance, which is only $1\frac{1}{2}$ cables wide. The shores of the bay and of the entrance to the port are bluff, clear of danger, and steep-to. The entrance is very narrow and steep-to. The chart will give a better idea of it than any description. The anchorage is fit for vessels of any description, but is difficult for a sailing-vessel to leave. A vessel depending on the land-breeze must get well off shore before it fails, as otherwise she will be becalmed with the swell and current setting directly on a dangerous lee shore.

Puerto de
Banes.

From point Cañones to point Mulas the coast trends N. by E. for 10 miles; is low and skirted by reefs extending 1 mile off shore.

Three miles N. of Cañones point is the small bay of Porto Rico, just abreast of the mouth of a rivulet. It is only approachable by boats.

Mulas point is formed by a small bluff, and from it the reef extends 2 miles off shore. It may be recognized by the Pan de Sama, before described, which bears from it W. by S. 14 miles distant. Manglito point is 5 miles NW. $\frac{1}{2}$ N. of Mulas point. Between them is a sandy beach.

Manglito point. Manglito point, also bluff, is skirted by a coral reef extending about $\frac{1}{4}$ of a mile off shore.

From here the coast trends about NW. for 3 miles to Lucrecia point.

The land here rises by degrees from the sea to a height of about 200 feet at a mile inland. From abreast Manglito point a reef skirts the shore for $1\frac{1}{2}$ miles westward at the distance of a cable. From the light-house the shore trends nearly W. for $1\frac{1}{4}$ miles to Gorda point, forming various points a little salient. This part of the coast is called Playa Larga, and it is bordered by a reef which extends northward $\frac{1}{4}$ of a mile. Between Manglito and Gorda points the shore is low and mostly of soboruco, with some parts covered with sand. At a short distance from the sea mangroves and trees are seen, and the coast appears somewhat higher than it really is.

Lucrecia Point
light.

Half a mile NW. of point Lucrecia and 100 yards from the beach is a white stone tower, from which is shown a red light revolving every minute, at a height of 112 feet above the sea. This light should be seen 15 miles in clear weather.

From Punta Gorda the coast trends NW. by W. for 6 miles to Sama point, $2\frac{1}{2}$ miles to the eastward of the harbor of the same name. Half way between these two points is a small bay called Rio Seco. All this coast is bluff and steep to except the shores of this bay, which are beaches bordered by shallow water.

Puerto de
Sama.

Puerto de Sama is a small inlet about $1\frac{1}{2}$ miles long N. and S., from 1 to 2 cables wide, and only fit for vessels drawing not more than 11 feet of water. The entrance may be readily found by the Pan de Sama, which rises S. of it. To the westward of the port there is also the table-land or flat-topped ridge of mountains running NW. and SE. Its W. end is bold, scarped, and of a whitish appearance.

Between port Sama and port Naranjo, 4 miles to the westward, the shore is sandy and is called Guarda-la-Vaca. To the southward there is a detached conical hill, and to the

SW. is a small flat-topped mountain, covered with trees, called the Mesa de Naranjo, or Loma de Templo. The entrance to port Naranjo lies between these two elevations. The E. side of the entrance is formed by a high, steep bluff, of reddish color; another cliff, similar in appearance, lying 3 miles to windward. The coast between ports Sama and Naranjo is bordered by a reef at the distance of half a mile.

Port Naranjo is a basin of irregular shape, having depth and capacity enough for vessels of any size, which are sheltered entirely from wind and sea. The entrance is only 1 cable wide, but the port can be entered or left by sailing-vessels with the usual trade-winds. In the middle of the harbor are the same islets, among which are Grand cay, the Tres Hermanos cays, and others. The entrance channel runs NNW. and SSE.

To enter the harbor bring the mouth of the entrance to bear S., giving the reef bordering the shore a berth of 1 mile or more. Then steer in, giving the eastern point a berth of 1 cable to avoid the shallow sand-bank which extends about $\frac{3}{4}$ of a cable off it. Care must be taken to avoid the bank which also borders the western shore, and which extends nearly 2 cables northward from the outer point. Having steered through the entrance by the eye, a good berth will be found in 9 fathoms of water, off a small sandy cove $\frac{1}{2}$ a mile inside of the outer points. If it is desired to proceed further in, it can be done with safety, as there are believed to be no hidden dangers, and the water shoals gradually toward the head of the harbor.

Wood and water may be obtained here. A road leads from this harbor to Holguin, a town of considerable importance, 50 miles inland. The tide rises and falls $3\frac{1}{2}$ feet.

From Puerto de Naranjo the coast trends WNW. for $2\frac{1}{2}$ miles to point Pesquero-nuevo, steep and clear of danger, then WSW. $2\frac{1}{2}$ miles to the entrance to Puerto de Vita.

This part of the coast is low, sandy, and steep-to, with no hidden dangers.

Port Vita is a small, irregularly-shaped inlet, easily entered and left by vessels of not more than 18 feet, with the aid of the chart.

Puerto de Bariay. Puerto de Bariay is 3 miles westward of Puerto de Vita.

The shore between them is clear of danger. Port Bariay is open to the northward, and, therefore, not safe in the winter months, but there is good temporary anchorage close under the weather-shore off the second sandy beach from the entrance.

Farther in the channel is partially obstructed by a shoal on which there is as little as 6 feet of water.

Port Jururu. Puerto de Jururu, 1 mile westward of Bariay, is larger and completely sheltered, with a depth of 4 fathoms. The entrance is narrow and somewhat crooked, but can be easily navigated by a steamer of moderate length by the aid of the chart.

Port Gibara. From Jururu to Puerto de Gibara the shore is low and skirted by a bank extending about $\frac{1}{4}$ of a mile off shore. Gibara is merely a small bay open to the northward, having a depth of $3\frac{1}{4}$ fathoms just inside the points of the entrance.

Three small hills to the southward of the port, and which from the offing resemble islands, serve as landmarks for this vicinity. The easternmost of these is called the Saddle of Gibara, the middle one is shaped like a sugar-loaf, and the westernmost is called Mount Candelaria.

Still farther to the westward are the Soccarreño hills, considerably higher. The town is on the western side of the bay and can be seen at a distance of 9 miles.

The entrance is $\frac{1}{2}$ a mile wide and clear of danger. A rocky ledge, called the Potrerillo reef, on which there are several detached rocks, extends $\frac{1}{4}$ of a mile to the NW. from the eastern point.

To enter the harbor it is only necessary to bring the entrance well open and steer in half way between the points of entrance.

There is said to be a bank near the middle of the bay, called the Casco de San Vicente, but no definite information can be given as to its exact location or depth of water. It may, however, be avoided by keeping the eastern shore aboard. Although there is no shelter from northerly winds and the harbor is only fit for small vessels, it is the port of Holguin, a large town about 15 miles inland in a highly productive part of the country. The river Gibara, navigable

for a short distance by boats, empties into the head of the bay. Coast-pilots for the N. coast of Cuba and the old Bahama channel may be obtained here.

The coast from Puerto de Gibara runs N. for 2 miles to Punta Brava and is rocky and steep-to, then from Punta Brava 10 miles NW. by N., still bold and rocky, to Mangles point. From here it trends NW. by W. 5 miles, still clear of danger, but sandy, to the eastern point of Herradura bay, thence W. for 6 miles, skirted by a reef to Puerto del Padre. This latter part of the coast is low, and on the shore are numerous fan-shaped palm-trees. To the westward of Puerto del Padre are two small flat topped hills close together.

Puerto del Padre is a secure and capacious basin, with a ^{Puerto del Padre.} depth of at least 4 fathoms in the greater part of it. The entrance is at the bottom of a small bay, the mouth of which between point Jarro on the E. and point Guinchos on the W. is $2\frac{1}{4}$ miles wide. The latter point has a small islet near it called cayo Guinchos. The western side of this bay is steep-to. To enter the port it is only necessary to keep well off the reef which terminates off point Jarro, and when this point bears about SE. stand into the bay, keeping near the western shore. Steer in mid-channel and with the aid of the chart no difficulty will be found as there are no hidden dangers. There is a village on the western side of the entrance.

The harbor is nearly divided in two parts. The eastern-most will be found the most convenient for leaving with a sailing-vessel. The channel leading to it is between the two islands just inside the entrance.

The shores of the harbor are low and swampy.

The shore from port Padre continues its westerly direction for 5 miles to Piedra point, where there is a small opening leading into the bay or port of Malagueta, an extensive unnavigable lagoon. The land around is low and swampy. From thence the coast takes a NNW. direction $3\frac{1}{2}$ miles to Covarrubias point, and then WNW. $8\frac{1}{2}$ miles to port Manati. All this coast is skirted by a reef to the distance of about 2 miles.

Puerto de Manati has a depth of $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms. It ^{Puerto de Manati.} is merely a long, narrow, crooked channel, bordered by shoal

banks on both sides and leading into a shallow lagoon, surrounded by low marshy land. The place is only fit for small coasters. On its western side is a conical hill called el Mañueco, and a little beyond it another, not quite so high, called the Pardo or Mesa de Manati. These elevations may be seen 15 or 20 miles and are good guides for the offing.

When seen nearly in line they somewhat resemble the Saddle of Gibara, and if mistaken for it the error might lead to accidents.

Puerto de
Nuevas Grandes.

From Manati point the coast trends about NNW. 2 miles to Brava point, and then W. by N. 5 miles to the entrance of Nuevas Grandes, which is merely a small tortuous inlet, in some parts only half a cable wide, and only navigable for vessels under 12 feet draught. All this part of the shore is foul, the reef extending off about two-thirds of a mile from the entrance of the inlet, through which a channel is formed leading to the port.

Puerto de Nue-
vitas del Prin-
cipe.

From Nuevas Grandes the coast trends N. by W. $\frac{1}{2}$ W. $6\frac{1}{2}$ miles to point Ganado, then NNW. $\frac{1}{2}$ W. $3\frac{1}{2}$ miles to Muer-tos point. Two miles farther to the westward is the entrance to the port of Nuevitas del Principe. All this part of the coast is bordered by a reef and should not be approached nearer than $2\frac{1}{2}$ miles.

Light.

Nuevitas is the port of the city of Principe, 25 miles inland, the two places being connected by a railway. The land is low and swampy for a considerable distance inland. The entrance of the harbor may be recognized by the Maternillo light-house, $4\frac{1}{2}$ miles NNW. $\frac{1}{2}$ W. from it, by three small hills on the S. side of the harbor, and by three islets in the harbor called Los Ballenatos, a little higher than the surrounding land. Also on the E. side of the entrance is a quadrangular building, painted yellow, surmounted by a white mast from which is shown at a height of 49 feet above the sea-level a *fixed white* light, visible 9 miles.

The harbor is large, completely sheltered, and capable of admitting vessels of the largest draught. The entrance is through a crooked, narrow channel, nearly 6 miles long, so that the assistance of a pilot is desirable, although there are no hidden dangers. The outer points of the entrance are low and about half a mile apart. In entering without a

pilot the eye and chart are the best guides. Care must be taken to avoid a dry sand-spit near the end of the eastern reef and bearing NE. by E. 1 mile from the flag-staff on the point.

If it is only desired to communicate with the town, anchorage will be found off the fort about $1\frac{1}{4}$ miles within the entrance. The town of San Fernando de Nuevitas is nearly 11 miles from the entrance, on the point of a peninsula which separates the southern part of the harbor from Marinavo bay.

At the entrance of the port the tidal stream is said to have a strength of 3 miles an hour, but inside the tides are felt but slightly. Tides.

The coast to the westward of Nuevitas is formed by a peninsula nearly separated from the main-land and called cayo Sabinal. The shore is very low and sandy, backed by numerous lagoons and swamps and skirted by a broken reef 1 to $1\frac{1}{2}$ miles off shore, with soundings about one-third of a mile outside of it.

Between this reef and the coast there are anchorages for vessels whose draught does not exceed 9 feet, such as Tortuguilla, Cruces, and Caravelas, where there is shelter from the ordinary winds, but not from the northward. These anchorages are entered through the openings in the reef, which are shown by the sea breaking, and a vessel may steer in by the lead and eye and anchor, when sheltered, as convenient.

Maternillos point lies $4\frac{1}{2}$ miles NNW. $\frac{1}{2}$ W. from the entrance to port Nuevitas. The coast between is low, but free of danger.

The light-house on Maternillos point is a white tower 165 feet high, with the word *Colon* painted on it. From it, at a height of 176 feet above the sea-level, a *revolving white* light is exhibited, attaining its greatest brilliancy every minute, and visible at a distance of 18 miles. Light

The coast from Maternillos point trends about NW. by W. $\frac{1}{2}$ W. 20 miles to the Boca de Caravelos.

The only remarkable object on this coast is a large clump of mangrove-trees about 10 miles to the westward of Maternillos point, called the Alto de Juan Dañue. Very near it is a small cay 30 feet high.

The Boca de Caravelas is a narrow opening between Cayo Sabinal and Guajaba island. There is a depth of 1 fathom on its bar and about the same depth may be carried through a crooked channel between the mangrove-cays as far as the town and river of Guanaja, 22 miles to the westward. This village is on the great bay of the same name bounded by the coast of Cuba and the cays of Guajaba and Romano.

At the entrance of the Boca de Carabela the tide runs at the rate of 3 knots.

Guajaba island. From the Boca de Caravelas the NE. side of the island of Guajaba trends nearly NW. 10 miles. For the first 4 miles it is a low mangrove-shore; the remainder is a sandy beach. It is all along skirted by reefs at a distance of nearly 2 miles, which continue from the Boca de Caravelas to Verd and Confites cays, forming various breaks which afford anchorage for small vessels of not more than 7 feet draught. On this island are two small hills. The SE. hill is about a mile in extent NW. and SE., and 90 feet high; the other is a smaller round lump and a little less elevated. When first seen from the eastward they have the appearance of four small hummocks, and serve as guides to this part of the coast.

Boca Guajaba, which separates this island from cayo Romano, has a depth of 5 feet at its entrance at low water, the tide runs 2 knots an hour, and there is a boat-channel with 3 feet water up to Guanaja. At about 7 miles to the NNW. of the opening there is a remarkable hill on the eastern end of cayo Romano, 230 feet high, which cannot be mistaken. Under it will be seen two fishing-stations near the beach. The edge of the bank is here about $1\frac{1}{2}$ miles off, and the reef a little inside it.

Cay Verde. At about $5\frac{1}{2}$ miles to the northward of the above hill is a small low islet, of a circular form and a cable in diameter, covered with bushes to the height of 10 feet above high water, and inside the reef, called cay Verde. North by E. of the river Guajaba there is an opening through which 10 feet water may be carried, and $\frac{1}{2}$ a mile SW. of cay Verde there is shelter for vessels of this draught against northers. The best channel to take is that round the N. end of the reef, about $1\frac{1}{2}$ miles from the cay; but it requires good local knowledge of the place to enable a vessel to thread her way safely through the shoals.

Cay Confites is a low cay, $\frac{1}{2}$ a mile long N. and S., 1 cable wide, and lies close on the edge of soundings, 4 miles N. by W. of cay Verde, $4\frac{1}{2}$ miles E. by N. from the SE. end of cay Cruz, 12 miles S. by W. $\frac{1}{4}$ W. from cay Lobos, and 19 miles W. of Diamond point, at the entrance of the Old Bahama channel. On its S. end there is a pile of stones, and near the N. end a solitary tree, which is the first object seen when coming from the SE. Off the N. end a dry reef extends to the distance of 1 mile, leaving a small channel 12 feet deep between it and the cay. A dry reef also extends from the S. end.

Between this latter dry reef and the reef running off to the northward of cay Verde there is a clear channel carrying a depth of 5 fathoms, and leading into anchorage under cay Confites in from 2 to 4 fathoms on white sand. The best-sheltered berth is with the cay bearing NE. about a mile off, or nearer, according to the vessel's draught. It should be observed, however, that with the wind to the southward of E., a heavy roll of the sea sets in round the S. end of the cay. This is the only anchorage on this side of the Bahama channel between Nuevitas and Paredon Grande cay, where a vessel drawing more than 12 feet can ride out a norther in safety.

In passing through the channel between cay Verde and cay Confites keep a little closer to the latter than the former. When the middle of Confites cay bears NW. and cay Verde S. by W., a vessel will be on the edge of the bank of soundings, or nearly so. Then steer WNW. till the S. end of cay Confites bears N. Thence the course is about NNW. till the southern end of Confites cay bears NE., where the anchor may be let go in 3 to 4 fathoms of water; sandy bottom.

In quitting this anchorage, if the wind does not permit a vessel to leave by the SE. channel, steer to the NW. until clear of the reef extending from the N. end of the cay.

Cay Cruz is about $12\frac{1}{2}$ miles long in about a NW. $\frac{1}{2}$ N. and SE. $\frac{1}{2}$ S. direction, very low and flat, with a sandy shore, and at its NE. point there is a remarkable clump of trees 30 feet high. At a mile WNW. of the clump of trees is a sand-bank, which is only seen when near it. The cay is divided in the centre by a small cut, and abreast it on cay Romano

Cay Cruz.

there is a remarkable hummock 100 feet high, called the Alto de Asi. Between these two cays there is only a foot of water at low tides, and the bottom is like pipe-clay.

Palomas cay.

West-northwest of cay Verde, at 7 miles distance, is a small round cay, of moderate height, called Palomas cay, with several smaller islets near it. Palomas cay can generally be seen from the offing before Verde or Confites cays.

Anton cays.

Rather more than $\frac{1}{2}$ a mile WNW. of the northern part of cayo Cruz is Caiman cay, somewhat higher than the islets near it. Seven miles farther, in the same direction, a chain of islets, called the Anton cays, commences, continuing for 6 miles in a WNW. direction to Paredon Grande cay. The largest of the Anton cays is called El Barril. They are surrounded by reefs and present no features worthy of remark.

Tributarios de
Minerva reef.

Two miles N. of the northern part of cayo Cruz, and $3\frac{1}{2}$ to the eastward of the northern extremity of Carman cay, is a reef called the Tributarios de Minerva, on which the sea breaks in fresh breezes, and which uncovers at low water. It lies $\frac{1}{3}$ of a mile within the edge of soundings. There are other reefs in this vicinity which generally break; among them is the Minerva reef, 5 miles SE. $\frac{1}{2}$ S. from the Tributarios reef.

The edge of the bank between cay Confites and the Tributarios de Minerva runs NW. $\frac{1}{2}$ W. in a straight line for $14\frac{1}{2}$ miles, and may be seen from aloft, the white sandy bottom showing itself distinctly just within the line of soundings, which is very steep-to. This part is extremely dangerous and should be approached very cautiously, as there is no safe anchorage whatever.

The space between Caiman and Paredon Grande cay is interrupted by low cays, sand-banks, and reefs. From the Tributarios de Minerva the edge of the bank takes about a NW. by W. $\frac{1}{2}$ W. direction for 17 miles, when it comes within 2 miles of the N. end of Paredon Grande cay, which is about 5 miles in length E. and W., rocky, woody, and about 40 feet high. Guinchos (or Ginger) cay, on the edge of the Bahama bank, bears from the N. point of Paredon Grande N. $\frac{3}{4}$ E., distant 16 miles.

Light.

On the northern part of Paredon Grande cay is an iron structure of brown color, 128 feet high, with a base of hewn stone erected on a foundation of rock. It exhibits at 159

feet above the sea a *fixed white* light, varied by a *flash* every *minute*, and visible 20 miles.

NW. of Paredon Grande cay and close to it is a round cay of regular height; and $2\frac{1}{4}$ miles W. of the latter is another similar cay, 25 feet high, named Paredon del Medio. These cays afford shelter with the wind from NE. to E. for vessels of 9 feet draught, but with the wind from NNE. it is necessary to leave the anchorage in consequence of the heavy sea which sets in. The Paredon del Medio is foul on the N. and E. and a vessel cannot pass inside it. About half-way between the two Paredons, or $1\frac{1}{2}$ miles from the Grande, lies a bank on which the sea generally breaks.

Between cay Confites and Paredon del Medio there is no anchorage, as the space is full of shoals not sufficiently large to afford shelter. The bank should not be entered upon without some specific purpose.

The only good water to be obtained at any of these cays is from a few springs or wells. In some places by digging in the sand it may be found, but is generally brackish.

The tidal streams set right on and off the bank at the rate of about $\frac{1}{2}$ a knot an hour, but in the openings between the cays they run from 2 to 3 knots. It is high water, full and change, at 7^h 30^m, and the rise at spring tides is 3 feet. Between the cays and the main the rise and fall is not more than 1 foot, and the stream is scarcely perceptible.

Inside the chain of cays and reefs just described, and separated from the Cuban shore by a sort of shallow lagoon, is cayo Romano, mostly covered with a mangrove swamp and divided in two by a narrow inlet. It extends 50 miles SE. and NW. from Boca Guajaba to Coco cay, from which it is separated by a channel about $\frac{1}{2}$ a mile wide and 4 feet deep. On the eastern end of Romano cay is a remarkable hill 230 feet high, lying 7 miles NNW. of the Boca Guajaba. At the foot of this hill, called the Silla de Romano, on the beach will be seen two fishing-stations.

There is a smaller hill 16 miles to the NW., and only 100 feet high, called the Alto de Asi. Another similar hill, near the NW. extremity of the cay, is called Juan Saez.

The bottom between cayo Romano and the Cuban shore is of olive-colored mud, covered with weeds.

Coco cay is low, 19 miles long E. and W. On the northern part are several sandy places; the southern part is covered with mangroves.

Cay Romano
harbor.

In the northern part of the cay is the harbor of the same name, sheltered from NE. to E. by Jaula cay and a small reef uniting it to Coco cay. This anchorage is entirely exposed to northers, and is only fit for coasters. Nearly N. from the eastern part of Coco cay, and $\frac{3}{4}$ of a mile distant, is Queche cay, small, flat, and covered with mangroves.

WNW. from Paredon del Medio, on the edge of the bank, are two shoals, one $2\frac{1}{2}$ miles and the other 4 miles distant.

Jaula cay lies 3 miles W. by N. of the northern part of Coco cay, to which it is joined by a reef.

The San Felipe cays are three small islets lying in a WNW. direction from Jaula cay. The smallest and nearest is 4 miles, the middle one 6 miles, and the westernmost $7\frac{1}{2}$ miles from Jaula cay.

Guillermo cay lies 6 miles westward from the northern point of Coco cay, is $5\frac{1}{2}$ miles long ESE. and WNW., and moderately high toward the western end.

Two miles NW. from the northern point of Guillermo cay is Media Luna cay, flat and bordered with reefs on its southern and western sides. The Hijos de Guillermo are three small islets surrounded by reefs and lying $1\frac{1}{2}$ miles WNW. from the western point of Guillermo cay.

W. by N. from Media Luna cay, and lying on the edge of the bank of soundings, are two shoals, the nearer one 3 miles and the other 6 miles from the cay. South of these shoals and of San Felipe, Media Luna, and Santa Maria cays there is a channel from port Coco to the anchorage of cay Francés for vessels drawing not more than 9 feet.

WNW. of Media Luna cay is a group of small islets called Caynelos or little cays of Santa Maria. They extend over a space of 7 miles, and their eastern end lies 7 miles from Media Luna cay. A large cay, 6 miles long, called also Santa Maria, lies about 3 miles SW. of this group.

From the N. point of Paredon Grande cay the edge of the bank of soundings takes a W. by N. direction for 48 miles to a point about 3 miles NW. of Santa Maria cay; then trending WSW. for 13 miles till within 3 miles of the W. end of cay Francés.

The whole of this vicinity is very imperfectly laid down on the present charts, and urgently needs resurveying. It is consequently dangerous to approach, and only affords anchorage and shelter to coasters of light draught, the masters of which have an intimate knowledge of the localities.

Cay Francés lies $7\frac{1}{2}$ miles W. by S. $\frac{1}{4}$ S. from Santa Maria cay, is 4 miles long and of regular height. On its northern shore, which is clear of danger, are three small round hills in an E. and W. line; two of them close together and the third somewhat apart. These are called the Tetas de la Viuda. To the SW. on the Cuban shore the paps of Buena Vista and Mount Guajabana will also be seen. The former bears about SW. $\frac{1}{2}$ S. from the W. end of cay Francés, and the latter SW. $\frac{1}{2}$ W.

Cay Francés.

The western end of the cay is low and rocky, and on it is a flag-staff surmounted by a red half-barrel, and near it two huts inhabited by pilots.

This point is foul for $\frac{3}{4}$ of a mile. One and a half miles farther to the westward are depths of $3\frac{1}{2}$ fathoms.

With the usual NE. trade-winds there is good anchorage to the southward of the reef, extending from the western end of cay Francés. This anchorage is, however, only a narrow vein of deeper water, about $\frac{1}{3}$ of a mile wide and running E. and W. In standing in, keep the paps of Buena Vista well open to the westward of the Herradura cays and cay Cobos (lying S. of cay Francés) till the SW. end of cay Francés bears E. by S. Then haul round the sand-bank and anchor with the flag-staff bearing N. and a small white cliff on the W. side of the cay bearing E. by N.

Cay Francés anchorage.

In beating in for the anchorage do not stand to the northward into less than $3\frac{1}{2}$ fathoms, as the bank is steep-to. To the southward toward Cobos cay a vessel may safely go into 3 fathoms. Around cay Francés there is an abundance of excellent oysters.

There are some good wells at the S. end of Cobos cay, and water will be found at the port of Coco cay.

Puerto de Caibarien, on the main-land about 15 miles from cay Francés, is the port of San Juan de los Remedios, about 5 miles in the interior, the communication being by railroad. The channel to this port lies between Boca Chica, a small, flat cay 4 miles SW. by W. of the western part of

Puerto Caibarien.

cay Francés and the W. end of Cobos cay. Vessels drawing under 9 feet can anchor off the town of Caibarien, which contains about 1,500 inhabitants, but those of heavier draught load at cay Francés. The charge for pilotage to the former is \$48, to the latter \$1 a foot. Even with a pilot on board, vessels frequently run aground in the narrow and crooked channels between the cays.

Mountains.

The sierra de la Cunagua, visible more than 33 miles off, and rising nearly S. by E. of the small cay of Jaula, is flat table-land, with a break in the centre, sometimes difficult to be seen.

Las Lomas de los Perros form a continuation of a chain of mountains running E. and W. for a moderate distance, and are seen 15 to 18 miles northward of Santa Maria cays.

The paps of Buenavista are two round hills separated by an opening or break, which can be seen at a distance of more than 24 miles, and form part of a chain of mountains of moderate elevation, running WNW. and ESE.

Mount Guajabana or Caja de Muertos is small, and higher on the E. part than the W., toward which there is a declivity; it rises near the coast northward of Buenavista.

Fragoso cay.

Fragoso cay, the eastern point of which lies 5 miles W. of cay Francés, is 22 miles long SE. and NW. This cay is divided in three parts by two narrow and very shallow channels called the Bocas de Anton, through which not even boats can pass. The only elevation on this cay is a small conical hill near the middle called the Alto de Anton. About NE. by E. from this hill and 2 miles from the shore of the cay are the Almedinas reefs, on which the sea constantly breaks. Between Fragoso cay and these reefs there is a channel with $3\frac{1}{4}$ fathoms of water.

Another reef lies $1\frac{1}{2}$ miles NE. from the N. point of the cay.

Between Fragoso cay and the main-land there are several groups of cays, but they are of little consequence to the navigator, as no available channels are known to exist between them.

WNW. of Fragoso cay are numerous islets, among which are Medio cay; the Pajonal cays, three in number; Guayacones cay; the Carenero cays, four in number; the Marcos

cays, two in number, and cay d'Alto. The northern point of the western Carenero cay is called point Tocinera.

Medio cay forms with the western point of Fragoso cay a passage called the Boca de Sagua Chica, only fit for very small vessels. Medio cay also forms with the Carenero group another channel, called the Boca de Marcos, only navigable for vessels of 5 feet draught, and leading toward the mouth of the Sagua Chica river, the bay of Higueritas, and other landing-places along this part of the coast.

From cay Francés to cay La Vela the edge of the bank of soundings is from $2\frac{1}{2}$ to 3 miles off the cays. Off the Pajonal cays the edge of the bank is only about 1 mile distant.

Three miles NW. by N. from Tocinera point is a small flat cay called La Vela, SW. of which there is anchorage for vessels of 10 feet draught, sheltered from E. and NE. winds, but open to the NW. To reach it haul round the western end of La Vela cay and anchor as convenient.

Anchorage.

The Boca de Lanzanillo is a channel between the cay of the same name and Carenero cay, $\frac{1}{2}$ a mile wide and $1\frac{3}{4}$ fathoms deep, and leading to Lanzanillo anchorage, of which Lieut. Don Rafael de Aragon, commanding the Spanish steamship *Don Juan de Austria*, gives the following description:

Lanzanillo anchorage.

"This anchorage is a commodious and secure harbor for vessels drawing less than 11 feet. It lies between Lanzanillo and Carenero cays, and is completely land-locked by them and other cays adjacent, so as to be sheltered from all winds. It is clear of hidden dangers, and has a depth of 11 feet of water, with excellent muddy holding-ground. Lying between Caibarien and Sagua la Grande, its shelter may be reached when there is not time to reach either of these other ports. The channel leading to it, between Lanzanillo and Carenero cays, is bordered with reefs on either side, and has also a hidden shoal in its centre, dividing the channel in two, of which the leeward or western one is preferable, being the deeper. Although this channel is short, it is somewhat difficult, as the reefs on the sides, as well as the shoal in the centre, can seldom be seen. A beacon has therefore been planted in 9 feet of water at low tide, on the most salient part of the reef, on the western side of the lee

or western channel. The beacon is formed by a pile deeply driven into the bottom, and surmounted by a large disk of elliptical shape and painted white, upon which is painted, in black letters, '9 *pies*.'

"In approaching this anchorage from the offing, steer for a fisherman's hut, of white color and easily seen, situated on the beach of Lanzanillo cay. Leave La Vela cay on the port hand, skirting the bank extending off its western end. When the channel is well open the beacon will be seen, and should be passed close-to, leaving it on the starboard hand. In this way the shoal in the centre of the channel will be avoided.

"After passing the beacon, Carenero cay and reef should be carefully rounded, anchoring under their shelter, as convenient, in 11 feet of water, muddy bottom."

Three and three-quarters miles W. by N. $\frac{1}{4}$ N. from La Vela cay is the easternmost of a moderately high group of cays called the Jutias Gordas, and extending in a westerly direction $4\frac{1}{3}$ miles to the Boca del Seron.

One and three-quarters miles from the northern part of the easternmost of the Jutias Gordas cays is a cluster of three small flat islets. To the westward of these cays a broken reef extends for 3 miles to the westward.

Entrance to
Sagua la Grande.

The entrance of the river Sagua la Grande has several channels of approach. The first one, coming from the eastward, is the Boca del Seron, lying between the reef which extends westwardly from the Jutias Gordas cays and a shoal $\frac{1}{2}$ a mile to the westward, and on which the sea generally breaks.

The next pass is the Boca de Canete, $2\frac{1}{4}$ miles farther to the westward.

The inner part of this channel is obstructed by a bar only passable for vessels of 5 feet draught.

The Boca de Maravillas or Marillanes lies 2 miles WNW. of the Boca de Canete, from which it is separated by Mariposa cay. This is the best and deepest entrance to the harbor of Sagua la Grande, being capable of admitting vessels drawing $16\frac{1}{2}$ feet. It lies between Mariposa and Cruz cays, and is $\frac{1}{4}$ of a mile wide.

Northwest by W. $\frac{1}{2}$ W. 3 miles from the hut on the E. end

of Cruz cay is a rocky patch $\frac{1}{4}$ of a mile in diameter, called the Cabeza de Canete, on which the sea breaks.

North-northwest from the same hut, at 3 miles distance, is a bank of rocks nearly awash, called the Cabezo de Marillanes. Its western end is marked by a conical red buoy in 16 feet of water.

One and three-fourths miles W. by N. $\frac{1}{2}$ N. from the Cabezo de Marillanes is the east end of Cristo cay, nearly 2 miles long, low and marshy. At its eastern end are some huts occupied by pilots, and near them a flag-staff, from which is displayed a blue flag, on which is the letter P in white.

In approaching the harbor of Sagua la Grande all vessels of more than $8\frac{1}{2}$ feet draught should take the Boca de Marillanes. To do this, if intending to take a pilot, bring the pilot-station on cay Cristo to bear about SW. by W. from $\frac{1}{2}$ a mile to 1 mile distant, and heave-to till his arrival.

If not intending to take a pilot steer about SE., leaving the buoy* on the Cabezo de Marillanes on the port hand and rounding another, called the bar-buoy, at about a cable's distance, leaving it on the starboard hand. This latter buoy is on the eastern end of a small gravel-bank; is also red and conical.† On rounding it bring the pilot-houses on the SE. end of Cruz cay on with the large white warehouses on the point at the mouth of the Sagua la Grande river, or nearly so, steering about SW. by S. and passing between Mariposa and Cruz cays, carrying from 15 to 20 feet. Southwest of Mariposa cay a small bank extends, also called the Cabezo de Canete, the western end of which is marked by a buoy. Leave this buoy on the port hand, passing close to it and hauling to the southward between it and the Palomas cays, and anchoring in about 15 feet of water as convenient.

* These buoys are liable to be washed away, and cannot be implicitly depended upon.

† A buoy has been placed in $2\frac{3}{4}$ fathoms at low water on the shoal to the leeward of the channel over the bar. In order to enter over the bar, leave the buoy on the NW. point of Marillanes bank on the port side, and when reaching the bar keep the new buoy on the starboard side and steer farther on toward the S. point of Cruz cay, from where the beacons on Canete shoal can be seen.—(*U. S. Hyd. Office Notice to Mariners, August, 1876.*)

The land is low all round the harbor, affording no leading marks, but with attention to the soundings and the aid of the chart there need be no difficulty.

On Practicos point, at the SE. end of Cristo cay, a red and white light is said to be shown on nights when the Havana steamer is expected.

The harbor of Sagua la Grande is of very irregular shape and is about 14 miles long WNW. and ESE., and 8 miles wide. The land surrounding it is so low that but little shelter from the wind is found, and in threatening weather, particularly during the months of September and October, precautions should be taken against dragging or parting.

The mouth of the river Sagua la Grande is about $2\frac{1}{2}$ miles SW. by S. from the Boca de Marillanes, and its entrance is marked by stakes. On the eastern side of the entrance are some warehouses and near by is the terminus of a railway leading to the town of Sagua la Grande, 12 miles distant by rail, but 21 miles by the windings of the river. The river bar is passable for vessels of 6 feet draught. The Canal del Cristo, just to the westward of Cristo cay, is only fit for vessels of less than 7 feet draught, and then can only be made available with good local knowledge.

The Boca de Sagua la Grande, about 7 miles NW. by W. from the Boca de Marillanes, is only passable for vessels drawing less than 8 feet, though at the entrance there is sheltered anchorage for vessels of 14 feet draught.

Light.

On Rancheria point, the NW. extremity of Hicacal cay, a *fixed white* light is shown from a pole on the keeper's dwelling. The light is 55 feet above the sea, and in clear weather should be seen 8 miles.

For entering the anchorage the eye and the chart are the best guides in the absence of a pilot, who may be obtained generally without difficulty.

The tide at Sagua la Grande rises and falls about 2 feet.

From the western point of the Boca de Sagua la Grande a chain of rocky heads extends, bordering the cays as far as Verde cay, $7\frac{1}{2}$ miles, in a NW. by W. $\frac{1}{2}$ W. direction. On this reef the sea breaks constantly.

Near the edge of the bank of soundings and about half a mile N. of Verde cay is a reef which, with a similar one 1

mile to the westward, forms an opening affording passage to light-draught vessels.

Medano islet, 6 miles NW. $\frac{3}{4}$ W. of cay Verde, is a small, flat, sand cay, about 25 yards long and 10 wide. This islet is bordered by the Nicolao reef sweeping round from NE. to NW. at about a quarter of a mile distance. One mile SW. by W. $\frac{1}{4}$ W. of it is a rocky head, uncovered at low water and on which the sea constantly breaks.

Two miles WNW. of Medina islet is the Alcatraces shoal. This part of the coast is little known and inaccurately laid down on the charts. The following land-marks will be found useful in determining a ship's position:

About 21 miles inland from the Nicolao reef and the Medina islet are the Sierras Morenas, extending NW. and SE. for a considerable distance and having several prominent peaks. The peak nearest the NW. end of this chain bears S. $\frac{1}{2}$ W. from the Nicolao reef.

A little to the westward of the Sierra Morena is a chain of mountains presenting three peaks called the Tetas de la Bella, the central one being the highest and bearing SSW. from the Nicolao reef. This peak bears directly S. from Bahia de Cádiz cay, consequently when it is on that bearing a vessel will be to the westward of the Alcatraces and Nicolao reefs.

W. $\frac{3}{4}$ S. $8\frac{1}{2}$ miles from Nicolao reef is Bahia de Cádiz cay, small and low, with some fishermen's huts and a flag-staff on its NE. point.

Near the NE. point of the cay is an iron light-house 159 feet high, painted white, from which is exhibited, 175 feet above the sea-level, a *fixed white* light varied by a *flash* every *minute* and visible, according to different authorities, from 17 to 24 miles. Light.

To the westward of Bahia de Cádiz cay is an anchorage sheltered from the usual NE. winds but exposed to northerly winds. In hauling round the W. end of the cay vessels drawing not more than 15 feet may bring the Tetas de la Bella to bear S. or S. $\frac{1}{2}$ E. and steer for them till the centre of Bahia de Cádiz cay bears E. $\frac{1}{2}$ N. or E. by N., when the anchor may be let go in 4 fathoms of water, sandy bottom. Vessels drawing more than 15 feet should bring the same peaks to bear S. by E. $\frac{1}{2}$ E. till the centre of the cay bears

E., then anchor in 5 fathoms. In standing in the depths will be 4, $4\frac{1}{2}$, and 5 fathoms, with a dark-colored bottom, it being sand covered with weeds.

Wood and fish are easily procurable at Bahia de Cádiz, but there is no water to be had.

Tides.

It is high water, full and change, at Bahia de Cádiz at 9^h 20^m, the tide rising and falling 3 feet.

S. by W. $\frac{1}{4}$ W., $6\frac{1}{2}$ miles from Nicolao reef, is the eastern extremity of the Alcatraces cays, and 9 miles SW. $\frac{1}{4}$ S. of the Médano, the western extremity. Between these cays and a chain named Falcones, extending SW. by S. and NE. by N., is the Boca de Alcatraces, where vessels of 9 feet draught will find shelter from all winds.

Cabezas cay, lying 7 miles westward of Bahia de Cádiz, has a dangerous ledge running from it to the westward, and as it lies on the edge of soundings it should be approached with great caution. About midway between this cay and Bahia de Cádiz is a shoal, on which the sea does not always break. From the Cabezas cay the edge of soundings takes a W. by N. direction for 17 miles to the N. end of Cruz del Padre cay, which is the northernmost of the whole chain. Thence the bank sweeps round to the SW., convex to the westward, and terminates near the west part of Ycacos point.

S. by W. $\frac{3}{4}$ W. $4\frac{1}{2}$ miles from Cabezas cay is the Pargo channel, and $3\frac{1}{2}$ miles farther to the westward the Barcos channel formed by the reefs and used by the small coasters which navigate among this extensive chain of cays.

From the latter channel the cays trend about WNW. for 4 miles to Galindo cay, off the N. side of which are two small islets. The northernmost of these two, about 1 mile off Galinda cay, is called Gallindito. From Galindo cay the line of cays continues to the NW. to Cruz del Padre. On both these cays there are wells of good water.

Light.

On the reefs about $\frac{3}{4}$ of a mile NE. of Cruz del Padre cay is a white tower, from which is exhibited, 49 feet above the sea, a *fixed white* light, visible 10 miles.

A group of cays forming the western extremity of the long chain extending westerly from Maternillos point, lies off the mouth of the Cardenas cays. Of these, Mono, Piedras, and Monillo cays lie about one mile from the edge of

the bank of soundings. The cluster called the Blancos cays, with Romero, Chalupa, Mangle, and Anas or Diana cays, lie about 5 miles farther inshore, forming numerous channels, generally, however, only fit for coasters.

This locality is very inaccurately and incompletely laid down on the charts, which must, therefore, be used with caution.

S. by W. $\frac{3}{4}$ W. $4\frac{1}{2}$ miles from Cruz del Padre cay is Blanco cay, divided by a narrow inlet, generally low and extending 4 miles NE. and SW. S. of this cay is good anchorage for vessels of 11 feet draught.

Mono cay lies 5 miles W. $\frac{3}{4}$ N. from the NE. point of Blanco cay. From it a shallow ledge runs off to the NE. a full quarter of a mile. In the same direction 1 mile distant from the cay there is a dangerous rocky shoal, with two fathoms of water on it. Mono cay.

Piedras cay, SW. $\frac{3}{4}$ W. 2 miles from Mono cay, is composed of rock and sand, partly covered with bushes, and is about 110 yards long. Midway between these two cays is a coral shoal, with only 3 fathoms of water on it. Piedras cay.

It lies with the Pan de Matanzas between the two rocks off the N. side of Piedras, bearing SW. by W. $\frac{1}{2}$ W., and Mono cay NE. $\frac{1}{2}$ N. There is no discoloration of the water, but the sea breaks in heavy weather. There is deep water on either side of the shoal to within $1\frac{1}{2}$ cables of the cays.

Piedras cay is steep to on its NW. side, but foul to the distance of $\frac{1}{3}$ of a mile on its SW. and southern sides, and from its SE. extremity a reef extends 1 cable. Off the N. side of the cay are two rocks above water.

On Piedras cay there is an iron light-tower, from which is exhibited, 58 feet above the level of the sea, a *fixed white* light varied by a *red flash* every *half-minute*, and visible from a distance of 15 miles. Light.

Monillo cay lies 1 mile SW. by W. $\frac{1}{4}$ W. from Piedras cay. It is only a small black rock, hardly above the sea. The channel between it and Piedras cay is said to be clear of danger and has a depth of 5 fathoms in the middle. One mile SE. of Monillo there is said to be a shoal, with $2\frac{1}{2}$ fathoms of water on it and $4\frac{1}{2}$ to 5 fathoms around it. There is good anchorage both S. and E. of cay Piedras in from 4 to 6 fathoms of water, sandy bottom.

Tides.

It is high water, full and change, at Piedras cay at 8^h 0^m, the tide rising and falling about 2½ feet.

Cárdenas bay
and town.

Cárdenas bay is about 9 miles deep NE. and S. W., and from 6 to 10 miles wide. The north side is bounded by a very narrow strip of low, sandy, wooded land, which terminates to the eastward at Yecacos or Icacos point; the entrance to this bay is so blocked up by small cays and shoals that it is only navigable for vessels of from 11 to 14 feet, according to different authorities, to the anchorages of Cárdenas and Signapa.

The town of Cárdenas stands on the swampy shore at the SW. side of the bay, and is a place of considerable commerce, and communicates by means of a railroad with Remba, about 18 miles in the interior. The town of Signapa is westward of Cárdenas, and they contain together some 5,000 inhabitants. The best channel is between cays Chalupa and Diana, or Anas. On the latter there is a large log-hut. The channel is pointed out by two spar-buoys on each side, painted white, with a strip of white bunting on their tops, but it requires a pilot. Small steamers and droghers navigate within the cays as far to the eastward as the river Sagua la Grande.

Light.

A *fixed white* light is exhibited from a mast or pole on the W. side of Diana cay, which is the second islet to the SE. of Yecacos point, and bears S. by E. about 5 miles from Piedras cay. The light is 43 feet above the level of the sea, and may be seen at a distance of 7 miles.

Icacos, or Yecacos point is the northern extremity of the long and narrow peninsula which shelters Cárdenas Bay to the northward. The point is low and has a few huts upon it. From here to Maya point, the eastern limit of Matanzas bay, the shore is steep-to and may be approached within 1 mile, but is low, sandy, and covered with brush-wood, the beaches being here and there interrupted by low bluffs.

Eight miles west of Icacos point is a small cove called Varadero bay. Four miles farther to the WSW. is the point and landing of Camacho, low and sandy. Five and one-half miles eastward of Maya point is the mouth of the river Camarioca, on the left bank of which is the town of the same name.

The coast is steep-to and clear of danger, the bank of soundings extending only $\frac{1}{2}$ mile off shore.

About 6 miles inland and 12 miles E. of Matanzas is a ridge of hills of irregular height, having three prominent and distinct peaks called the Tetas de Camarioca, the centre one of which bears SW. $\frac{3}{4}$ S. from the light-house on Piedras cay. The land to the westward of the three peaks just described is level, rising gently in the vicinity of Matanzas. It can be seen from a distance of $\frac{1}{2}$ 24 miles.

The town of Matanzas, the second in point of commercial importance in the island of Cuba, is situated at the head of a bay, open to the northward, about 2 miles wide at its entrance and 4 miles deep.

Matanzas.

Maya point, on the eastern side of the entrance, is low, with a few huts upon it. From this point a rocky ledge extends northward about 1 mile, and on a narrow bank of soundings W. of this ledge temporary anchorage will be found in 7 to 15 fathoms water.

The land on the western side of the entrance is bold and steep-to. South of Sabanilla the western shore of the bay is bordered by a 2-fathom bank extending off nearly $\frac{1}{4}$ of a mile.

In the SE. part of the bay is the mouth of the river Canimar. On the western point of its entrance is the battery and town of San Felipe. The river is navigable for 9 miles from its mouth, having a depth of from 6 to 15 feet. On the bar at the entrance there are only from 6 to 9 feet, and a heavy sea breaks there during northers.

River Canimar.

A large number of small vessels load with fruit in this river for Havana and Matanzas.

The rivers Yumuri and San Juan also empty into the bay, flowing through the city of Matanzas, and by the deposits of the sand and mud which their waters bring down form shoals and banks which narrow the limit and depth of the anchorage.

The city of Matanzas stands on a tongue of land separating these two rivers, and has extensive suburbs with which it is connected by stone bridges. A shallow mud-flat runs off in front of it, preventing vessels from coming nearer to the wharves than $\frac{1}{2}$ a mile.

The anchorage is sheltered to the NE. by the shoals in the SW. part of the bay.

Bajo Nuevo.

The Bajo Nuevo is the northernmost, is about 400 yards long, 60 yards wide, and is of rock. It lies E. $\frac{1}{4}$ N. $\frac{3}{4}$ of a mile from San Severino castle and 400 yards from the nearest part of the shore and is marked by a wooden buoy planted in 15 feet of water on the centre of the shoal.

Laja shoal.

The Laja shoal, with 6 feet of water on it, is SSW. of the Bajo Nuevo, from which it is separated by a channel 400 yards wide leading to the anchorage. It is marked by a wooden buoy moored in 15 feet of water on the NE. angle of the shoal.

South $\frac{1}{2}$ E. 3 cables from the castle of San Severino is a 13-foot shoal, about 1 cable long N. and S., marked by a buoy.

Southeast by S. $\frac{3}{4}$ of a mile from the same castle is a fourth shoal, circular, about 140 yards in diameter, with 13 feet of water on it, and marked by a buoy.

In fine weather these shoals may be seen from aloft.

Directions.

The Pan of Matanzas is an excellent land-mark for this vicinity. (See page 186.)

In approaching Puerto de Matanzas from the eastward give Maya point a berth of $1\frac{1}{2}$ miles, steering between W. and WSW. till the bay is well open, then haul up SW. taking care to avoid the bank of sand and stones having $2\frac{3}{4}$ fathoms of water on its edge, and which extends nearly 1 mile to the NW. As soon as San Severino castle, a fortification on the northern shore, bears W., steer for it till the Vigia fort at the mouth of the river San Juan bears S. $\frac{3}{4}$ W. Then haul up for the latter, passing between the Bajo Nuevo and Laja shoals, and anchor in 5 or 6 fathoms of water, muddy bottom, with San Severino castle bearing NW. $\frac{1}{2}$ N. about $\frac{1}{4}$ of a mile distant. Light-draught vessels may go farther in shore.

A large church N. of the town, in line with the Pan of Matanzas, bearing W. by S. $\frac{1}{4}$ S., will lead about 100 yards N. of the Laja shoal.

In approaching from the westward the same directions apply, keeping about $\frac{1}{4}$ to $\frac{1}{2}$ a mile from the shore till the castle of San Severino is made out.

As the bay is open to the ENE., a heavy swell sets in, with fresh trade-winds. The northers which frequently blow from September to February interrupt the land-breezes,

and the departure of a sailing-vessel may be hindered on this account.

It is high water, full and change, at Matanzas at 8^h a. m. and 5^h p. m. The greatest rise and fall of the tide is about 3½ feet, but generally it only rises and falls about 1 foot. Tides.

From Sabanilla point on the W. side of the entrance to Matanzas bay the coast trends for 7½ miles NW. to Guanós point. The shore is low and sandy, as is also the latter point, on which it is proposed to establish a light.

From Guanós point to Havana the coast takes a westerly direction for 36 miles. Several small streams empty into the sea between these two points, among which are the rivers Bacanagua, Puerto Escondido, Canasi, Jibacoa, Santa Cruz, Jaruco, Bacuranao, Guanabo, and Cojimar. Generally speaking, these rivers, excepting the Jaruco, cannot be entered even by boats. The mouth of the Jaruco river is open to the N. and only admits very small coasters.

The river Cojimar empties into the cove of the same name about 3 miles E. of the Morro Castle. This cove is clear of danger and the shores are steep-to. The water, except very close in shore, is too deep for vessels to anchor. At this place English troops landed in 1763 to attack Havana.

The end of one of the telegraph cables connecting Havana and Key West is landed here.

The coast is generally clear of danger except the bank of Jaruco, on which there are only 11 feet of water.

This bank lies 1½ miles off shore, about 18 miles E. of Havana, and off the Iron or Jaruco hills. The discolored water on this bank may be seen from aloft in clear weather.

CHAPTER VI.

THE WINDWARD CHANNEL AND JAMAICA, WITH THE NEIGHBORING BANKS AND CAYS.

Variation in 1876:

Navassa Island, 3° E. | Grand Cayman Islapd, 5° 25' E.

Port Royal, 3° 45' E.

The variation is decreasing about 2' annually.

Windward
channel.

The northern portion of the Windward channel between cape Maysi, the eastern point of the island of Cuba, and cape Nicola Mole, on the island of Santo Domingo, is 47 miles wide.

The southern portion, between cape Tiburon and Morant point, has a width of 102 miles.

The northern part of this channel is perfectly clear, presenting no danger whatever to navigation, but the southern part is somewhat obstructed by several banks and cays, among which are the Formigas bank, Navassa island, and Morant cays.

Currents.

The currents in the Windward channel generally set to the SW., attaining a strength of 1 to 2 knots between Cuba and San Domingo. S. of Cuba and Jamaica the set is more to the westward.

Navassa island.

Navassa island is 2 miles long NE. and SW. and 1 mile wide; it lies W. $\frac{3}{4}$ N. from cape Tiburon, 28 miles distant, and has a uniform height of about 300 feet.

Its surface is nearly level, with steep, sloping sides, terminating all round in bold perpendicular white cliffs about 20 feet high. The island is inaccessible, except at the landing platform on the NW. side of the island, used for the shipment of guano.

The island is of volcanic origin, composed of limestone interspersed with veins of sharp, honey-combed rocks of iron pyrites.

The spaces between the rocks are filled up with guano, which in some places is 14 feet deep.

With the exception of the NW. extreme, which is a prominent bluff, a narrow ridge, about 15 feet high above the

cliffs and a cable broad, extends all around the island. The summit is clothed with stunted palm-trees and cactus, and is inhabited by iguanas and numerous flocks of sea-birds.

The island is surrounded by a bank of soundings from $\frac{1}{3}$ to $\frac{3}{4}$ of a mile broad. On the N. and E. sides the bottom is rocky, and the depth from 18 to 40 fathoms. On the W side the bottom is fine sand with small shells, and anchorage will be found sheltered from the usual trade-winds in 16 fathoms of water, good holding-ground, with the NW. bluff bearing N. or N. by E., and the SE. point ESE. about $\frac{1}{2}$ a mile off shore; but a heavy swell sets round the SE end of the island, and the current generally to the NW. The wind seldom blows from the westward. From the NW. end of the island a coral ledge with $4\frac{1}{2}$ fathoms of water on it extends a cable off.

Anchorage.

The NW. point is assumed to be in lat. $18^{\circ} 25' 10''$ N., lon. $75^{\circ} 2'$ W.

The SW. end of the Formigas bank lies NE. by N., about 39 miles from Morant Point light-house, and when on the centre the fall in the high land of Jamaica will be seen to the northward of Plantain Garden river bearing SW. $\frac{1}{4}$ S. The bank is 8 miles in length, in a NE. by N. and SW. by S. direction, and about $2\frac{1}{2}$ miles in breadth. It is steep-to and near its edge there is a narrow vein of sand with from 9 to 18 fathoms water on it; but the body of the bank is rocky, with a general depth of from 5 to 7 fathoms. At about 2 miles from the NE. end, and a mile from the eastern edge, there is a small patch with only $2\frac{1}{2}$ fathoms on it, and westward of it another with 3 fathoms, with $3\frac{1}{2}$ and 4 fathoms around them. With strong breezes the position of the bank may be recognized by the heavy swell which rolls over it.

Formigas bank.

The Morant cays are a group of four small islets from 3 to 10 feet high, forming a crescent convex to the SE., and occupying a space of about 5 miles. They lie about SSE. 32 miles from Morant Point light-house, and are named NE. cay, Sandy cay, SE. cay, and Seal or SW. cay. They are partially clothed with low bushes, and appear to lie on a bank which extends a considerable distance to the eastward of them. With the body of the cays bearing SW., distant 4 miles, the soundings are 18 fathoms, stony ground mixed

Morant cays.

with fine red-speckled gravel; and on a SSW. $\frac{1}{2}$ W. bearing 6 miles, the depth is 23 fathoms and a similar bottom. The E. side of the group is skirted to some distance by a dangerous reef, and from this quarter they should not be approached within $2\frac{1}{2}$ miles.

On the SE. cay is a single cocoanut-tree, and on NE. cay four trees.

Anchorage.

There is anchorage under the lee of the Morant cays, but be careful in approaching the NE. cay, as a reef runs off half a mile to the NW. of it and breaks, and a ledge with from 3 to $3\frac{1}{2}$ fathoms water on it extends nearly 2 miles to the westward. In standing for the anchorage from the northward, do not round this danger until the SW. cay bears S. by E., and when the N. extreme of the reef bears E. by N. a vessel will be abreast the end of the ledge. The SW. cay bearing S. will lead over the end of the ledge in $3\frac{1}{2}$ fathoms. The latter cay may be approached by the lead, and a vessel may stand into 5 or 6 fathoms. The best shelter will be found with the northern point of the NE. cay reef NE., the trees on SE. cay ESE., and Seal or SW. cay S. by E. in 7 fathoms of water, with a bottom of sand, grass, and shells. The tides at no time rise and fall more than 2 feet, and are influenced more by the winds than by the moon.

In standing in for the E. end of Jamaica from the SE., Yallahs hill, which bears from the Morant cays about NW. $\frac{1}{2}$ W. 45 miles, will be a useful guide in clear weather; and in working up to the northward of the cays, the NE. end of Jamaica kept open of Morant point will lead to windward of them. The current in the vicinity of the Morant cays is generally strong to the westward.

Banks.

Several reports have been received of banks in the Windward channel. H. M. brig Renard in 1805 sounded in 18 fathoms for 5 miles on an easterly course, on a bank considered to be 16 miles in length, in latitude $17^{\circ} 44' N.$, and NE. 27 miles from the Morant cays. Captain Livingstone states that he obtained bottom in 18 and 19 fathoms, about ENE. 50 miles from the cays, in longitude $75^{\circ} 12' W.$ More recent soundings of 16 fathoms have been reported in latitude $17^{\circ} 45'$ and longitude $74^{\circ} 39'$, and also in latitude $17^{\circ} 13'$ and longitude $74^{\circ} 58'$.

Mr. John S. Holt, master of the brig *Georgia*, reports in 1867, that on his passage from Kingston, Jamaica, toward Navassa island, he sounded in 14 fathoms of water, and from the color of the bottom he judged that some places on the bank had as little as 8 or 10 fathoms of water. The position of the shoal he gives as latitude $17^{\circ} 46'$ N., longitude $75^{\circ} 45'$ W. Point Morant bearing *by compass* W. by N. 28 miles.

There is doubtless a shoal in this vicinity, and the attention of navigators is called to the desirability of obtaining and publishing its exact position and extent.

Jamaica is the largest and most valuable of the British West India islands, being about 130 miles long E. and W., and having an extreme breadth of 45 miles. The general appearance is extremely beautiful. On the N. it rises into hills of gentle ascent, covered with pimento groves and intersected by valleys, while on the S. it presents abrupt precipices and inaccessible cliffs.

Jamaica.

The coast-line is 500 miles long; the northern shore is free of dangers and generally steep to, but the S. side, particularly near the middle, is deeply indented and fringed with reefs and cays, which must be cautiously approached. The principal ports are Kingston, Port Royal, Port Morant, Black river, and Savanna-la-Mer on the S. coast, and Lucea and Montego bay, Falmouth, St. Ann, Ports Maria and Antonio and Annotto bay on the N.

The Blue mountains, a lofty range, run through the whole length of the island from E. to W., attaining a height of 7,105 feet, but the highest peaks are generally hidden by clouds. Other shorter ranges branch off in every direction. The valleys are all very narrow, not more than a twentieth part of the island being level ground. The principal rivers are the Minho, Black river, and Cobre, all emptying on the S. coast, but none of them are navigable except for boats.

The land and sea breezes are regular except for a short time before the rainy season. The medium temperature of the year near Kingston ranges between 70° and 80° , but a difference of elevation affects the temperature very sensibly; at 4,200 feet above the sea it usually ranges between 55° and 65° . The year is divided into a short wet season, beginning in April or May and lasting about six weeks; a

short dry season from June to August, a long wet season, comprising September, October, and November, and a long dry season occupying the remaining four months, during which the weather is serene, pleasant, and comparatively cool.

Earthquakes are frequent and sometimes violent.

Hurricanes are not so frequent as in the Windward islands when they do happen, occurring generally between July and October.

The principal exports are coffee, rum, sugar, logwood, and tropical fruits. The population in 1871 was 506,154. The island called Xaymaca by the Caribs was discovered by Columbus in 1495 and was settled by the Spaniards in 1510, and in 1655 was taken by the English, to whom it has since belonged.

Morant point.

Morant point, the E. end of Jamaica, is formed by a strip of low, swampy, wooded land, extending about $2\frac{1}{2}$ miles from a low range of hills about 800 feet high, running parallel to the S. coast at the foot of the Blue mountains. It is about $2\frac{1}{2}$ miles broad at the inner part, and thence gradually diminishes to the point, which is sharp and well defined when seen from the N. and S. Approaching from the eastward, its position is first recognized by the iron light-house, 96 feet high and painted white, standing a few hundred feet within the high water mark. The point is skirted by a reef which extends off to the distance of nearly $\frac{1}{4}$ of a mile. There are 22 fathoms water at $1\frac{3}{4}$ miles off, close to the edge of the bank, and as the land is not more than 20 feet high, should the weather be thick or the light obscured, the greatest caution must be observed when nearing it. Overfalls are generally seen eastward of the point near the edge of soundings, and the stream runs at from 1 to 3 knots.

Light.

The light-house on Morant point exhibits at 115 feet above the sea a *white* light, which *revolves* every *minute*. The light is visible from seaward when bearing from NNE. $\frac{1}{2}$ E. round on westerly bearings to SE. by S., and in clear weather may be seen 15 miles.

In approaching Jamaica from the eastward, as in many other localities in the West Indies, great advantage will be gained from observing meridian altitudes of stars N. and S. at morning and evening twilight, after losing sight of Alta Vela, until Morant point light or Yallahs hill is sighted.

This so called hill is about 19 miles westward of the point and cannot be easily mistaken, being a remarkable mountain 2,408 feet high, rising rather abruptly on its N. side from the valley between it and the Blue mountain range, and falling with a long gradual slope to the sea on the S. side, and its rounded summit is seldom clouded.

Approaching from the NE. through the Windward channel, the Blue mountain mass will generally come first in sight, and strangers are apt to keep away too soon, which should not be done until the vessel's position is correctly ascertained, lest they may not be able to weather Morant point. It is advisable to keep well to windward until the light-house bears northward of W., as the current generally sets strong to the westward.

From Morant Point light the coast trends S. by W. $\frac{1}{2}$ W. $1\frac{1}{4}$ miles to Southeast point; between is a sandy bay studded with rocks. It then turns W. by S. $\frac{1}{2}$ S. for 5 miles to Rocky point, and continues in the same direction for 3 miles farther to port Morant. Between Southeast and Rocky points the reef extends from the shore to an average distance of 1 mile, and between Rocky point and port Morant to $\frac{1}{3}$ of a mile, and in ordinary weather the sea breaks heavily upon it. Within the reef at Rocky point is a secure anchorage for coasters and a good landing wharf. To seaward the bank of soundings extends about 1 mile.

Port Morant is a small secure bight, about 1 mile wide and $1\frac{1}{2}$ miles deep N. and S., open from the latter quarter, with a depth of between 5 and 6 fathoms. Two small islands lie 1 cable off the eastern side of the entrance, and are bordered by reefs, which, with those from the western side, contract the channel to a width of not more than 1 cable. The approach to the harbor is easily distinguished. The hills on the western side, between 400 and 500 feet high, slope gradually to the shore, and are higher than those on the eastern side, which rise abruptly from the sea. On the rise, near the upper part of the harbor, standing 180 feet high, is Bowden house. At the head of the harbor is a remarkable red cliff, and 2 miles inland, at an elevation of about 500 feet and between two palm-trees, will be seen Kelly house. Palm point, on the western side of the entrance, may be known by the conspicuous cluster of trees on it.

Port Morant.

Harbor shoal. Harbor shoal, a sandy knoll, with two fathoms on it, lies nearly in the centre of the port WNW. of point Pero, and with Kelly house open westward of the red cliff. Cotton-tree spit is a little northward of Harbor shoal, and extends from the eastern shore $\frac{1}{6}$ of a mile.

Buoys. On the eastern side of the channel leading into the port are two buoys. The outer in 26 feet is colored *black* and *white* in horizontal stripes; the inner in 20 feet is checkered *black* and *white*. On the western side is one *red* buoy in 26 feet.

Directions. In entering port Morant great attention must be paid to the leading mark, for, in strong trades and misty weather, some difficulty may be experienced in distinguishing Kelly house. Kelly house in line with the eastern extreme of Red cliff bearing N. $\frac{1}{2}$ E. leads on the eastern side of the channel and clear of Harbor shoal and Cotton-tree spit. When Pero point shuts in the low point S. of it, haul a little to the eastward of the leading mark and anchor in 5 or 6 fathoms with Bowden pier about NE. $\frac{1}{2}$ N. As a rule, vessels can enter or leave with the usual trade-winds, and they seldom wait for the land-wind in the morning. Good water may be obtained from the pier off the village. The rise of tide is about 1 foot.

From port Morant the shore bends in to W. by N. for about 4 miles to the town of Morant, and then to the WSW. 2 miles to Belvidere point, forming the bay. The reef still skirts the shore to the distance of about $\frac{1}{2}$ a mile, but becomes more broken, with a better channel within, and terminates altogether S. of the wharf at Morant. The sea breaks on this extreme end, and under the lee of it there is anchorage for large vessels in 5 or 6 fathoms water, with the court-house bearing about N. by E. A short distance westward of port Morant there is a narrow opening through the reef leading into Fisherman bay, in which the soundings are from 3 to 2 fathoms, but it is only fit for coasters. Within the reef to the westward are other anchorages of the same character. Off this part of the coast the bank of soundings extends about $1\frac{1}{4}$ miles.

The English church and the court-house, both a little northward of the principal wharf, are the most conspicuous buildings in the town.

Galatea rock is a small dangerous patch with $2\frac{3}{4}$ fathoms water on it, lying about 3 cables SW. of the western reef off Morant, with 7 fathoms between, and steep-to. From it Belvidere point bears W. $\frac{2}{3}$ N. $1\frac{4}{10}$ miles, and the court-house at Morant, N. $\frac{2}{3}$ E. three-quarters of a mile. Large ships standing *into* the bay should not bring the court-house to bear northward of NNE.

Galatea rock.

From Belvidere point the coast takes a W. by S. direction for 7 miles to Yallahs point, at the base of the lofty mountain already described. About 4 miles eastward of the latter point there is a small range of remarkable white cliffs of moderate height, called the Upper White Horses. Two miles southward of the White Horses is an extensive flat with a depth of 11 and 12 fathoms, dark sand; northward and southward of this flat the water is shoaler.

Lamottes bank, a small rocky patch of 4 fathoms, may be considered the commencement of a narrow bank of 7 to 9 fathoms, which curves in an easterly direction for 3 miles, until nearly south of Belvidere point. From the 4 fathoms Yallahs point bears WNW. $2\frac{1}{2}$ miles, and the centre of Upper White Horses NNE. $\frac{1}{2}$ E. $2\frac{1}{2}$ miles. The water is usually so clear that the bottom may be seen in 10 fathoms.

The coast from Yallahs point turns in a northerly direction for about half a mile, forming Salt Pond bay; thence it sweeps to the westward around Yallahs bay, which is $1\frac{3}{4}$ miles from the point. Cow Bay point, W. by N. 4 miles from Yallahs point, is low, rounded, and wooded, and its extreme is nearly two miles from the foot of the hills. One mile from the coast stands the chimney of the Albion estate, which, with the cultivated land around, are conspicuous from seaward. Small craft find shelter under Yallahs point from the strong trade-wind, which sometimes continues for 3 or 4 days. Large vessels might also anchor here, but care must be taken to avoid an 18-foot patch from which the point bears ESE., distant nearly $\frac{1}{3}$ of a mile.

In Yallahs bay vessels of considerable size load logwood; the best anchorage is S. of the centre of the bay, in 10 fathoms, about $\frac{1}{3}$ of a mile from the beach, but it would be prudent to weigh on the first signs of a southerly wind, as a very heavy sea sets into the bay, and ships have been wrecked here.

Off this portion of the coast, at a distance of about half a mile, the depth is 100 fathoms.

Westward of Yallahs bay, the river of that name flows into the sea. From Cow Bay point the coast trends with a slight curve inward, NW. $\frac{1}{2}$ N., for 4 miles to the Lower White Horses, a similar small ridge of cliffs to those eastward of Yallahs point. They lie at the base of a large round hill, 1,420 feet high, connected by sharp ridges with St. Catharine peak, of 5,100 feet, which is about 8 miles NE. of Kingston, and the same distance westward of the Blue mountains; this range forms the eastern boundary of the great plain of Liguanea, on the shore of which is the city of Kingston. From the Lower White Horses the coast runs to the WNW. for about 5 miles to the commencement of the Palisados, the foot of the Long mountain, and the head of Kingston harbor, over which is a conspicuous martello tower; 1 mile WNW. of the tower is a remarkable red cliff, which has been blasted to a considerable height and forms an excellent landmark. Along this portion of the coast the bank of soundings extends about half a mile from the shore.

Land and sea breezes are generally regular between point Morant and Port Royal; as far as Yallahs point the land-wind is felt but a short way from the shore, but westward it extends to a greater distance. Working off Port Morant in the early morning the sea-breeze is almost invariably met with, the land-wind being only of sufficient strength to carry a vessel clear of the harbor. Off Port Royal ships frequently carry it some distance to sea. In the early months of the year when the trade-wind is not very strong, the land-wind may come down with considerable, but never with dangerous strength; its approach will be known by a strong earthy or dusty smell. The strongest sea-breezes appear to be in June and July, and freshening as they advance westward, attain their greatest force off Port Royal. The time of commencement of the sea breeze varies from 9 a. m. to noon, and generally lasts until 5 or 6 p. m., but in some cases it may blow continually for three or four days. The beginning of the land-wind is equally uncertain. In the summer or hurricane months the breezes are sometimes interrupted by calms and light southerly winds, with heavy

rains, and an exceedingly oppressive atmosphere; the sea-breeze will rush in with violent squalls from the SE., and last but a short time.

Between point Morant and Port Royal, at an average distance of 3 miles from the shore, the current setting to the westward is seldom found to exceed one mile per hour, depending on the strength of the wind. East of point Morant it sets in a S. and SE. direction at the rate of between 2 and 3 knots, causing a heavy sea. Two or three days of south-westerly or westerly winds will cause a slight current in an opposite direction. After heavy rains the discharge from the rivers will for a short time cause a slight local set.

Currents.

From about one mile S. of the Martello tower, a low, narrow, sandy flat projects to the westward for about $7\frac{1}{2}$ miles, terminating in Port Royal point. This peculiar tongue of land is more or less overrun with low mangrove-bushes, particularly on its inner side, and is in part planted with cocoa-nut trees. It forms the spacious harbors of Port Royal and Kingston, and is called the Palisados. Near its western extremity is Fort Charles, and within it the town of Port Royal, naval hospital, and dock-yard. From its eastern extreme the sandy beach takes a W. $\frac{1}{2}$ S. direction for 2 miles, and then trends SW. for $1\frac{1}{2}$ miles to Plum point; hence also the edge of soundings takes a SW. and southerly direction for 9 miles.

Port Royal.

Eastward of Plum point the beach is fringed with a rocky ledge for about one cable, and about half a mile W. by N. of it is Little Plum point, both points being foul for about a quarter of a mile; westward the beach is cleaner, but rocks skirt some of the points.

At 66 yards northward of the extremity of Plum point is a white light-house, which exhibits at 68 feet above the sea a *fixed* light, visible 12 miles. The light shows *red* between the bearings of WNW. and N. $\frac{3}{4}$ E., and *white* from N. $\frac{3}{4}$ E. round by E. to SE. over the shoals fronting the harbor.

Light.

The E. channel to the harbor is formed on the N. by the Palisados, and on the S. by numerous low cays and banks, which extend off shore to the distance of 3 miles, and soundings will be found from 2 to 4 miles outside them. The outer danger at the entrance of the channel is called the East Middle ground, which lies SSW. about $1\frac{1}{4}$ miles from

Plum point. The channel is from 7 to 20 fathoms deep, and, with the exception of the shoals on either side, it is clear of danger up to Gun cay.

East Middle ground is a rocky bank composed of two knolls occupying a space of about $\frac{1}{2}$ a mile, and separated by a narrow cut of deep water in a N. and S. direction. On the eastern knoll there are 12 feet water, and on the western 8 feet, steep-to, and the sea generally breaks when strong sea-breezes prevail. A large *black* and *white* vertically-striped buoy, with a staff and vane, marks the NE. edge of the eastern knoll in 7 fathoms, with Kingston church bearing N. by W., and Maiden cay in one with Healthshire, or Helshire, hummock W. $\frac{1}{2}$ S.; the latter is a remarkable hill, 725 feet high, on the outer range of irregular hills on the S. side of the island.

Maiden cay
and rock.

Maiden rock lies about $1\frac{1}{2}$ miles westward of the East Middle ground and NE. $\frac{1}{4}$ of a mile from Maiden cay, which is sandy. It is a low barren rock 100 yards long E. and W. and 50 yards broad, having on its N. end a *black* beacon, with a vane 30 feet above the sea. It is connected to Maiden cay by a rocky ledge, dry in places, which extends also a cable to the northward of the beacon, and to the westward for about 4 cables.

Lime cay.

Lime cay is 2 cables long in a NNW. and SSE. direction, $\frac{1}{2}$ a cable broad, and partially covered with bushes. Its NW. end is rocky for $1\frac{1}{2}$ cables; the W. and SE. parts are sandy. In case of necessity a vessel will find anchorage close under its lee in 10 fathoms, muddy bottom, taking care, however, to avoid the Lime Cay shoal.

Lime Cay shoal is a rocky patch with $1\frac{1}{2}$ fathoms water on it, and about $\frac{1}{4}$ of a mile in length NW. and SE. The eastern ledge lies $2\frac{1}{2}$ cables westward of the NW. end of Lime cay.

Rackum and
Gun cays.

Rackum and Gun cays are the two innermost in this channel. The former lies W. by N. nearly $1\frac{1}{4}$ miles from Lime cay and SE. a little more than $\frac{1}{2}$ a mile from Port Royal point. It is very small, low, and barren, and from its N. end a ledge of small dry rocks extends out 1 cable in that direction, at the extremity of which is a *black* and *white* vertically-striped buoy in $3\frac{1}{2}$ fathoms water, with 5 fathoms close outside it. The cay is also foul on the S. and W. to

the distance of nearly $\frac{1}{4}$ of a mile, but steep-to on the E. side.

Gun cay, about 4 cables NNE. of Rackum cay, is somewhat larger, sandy, and bushy. It is skirted all round by a reef which extends only a short distance from its S. end, leaving a channel about 1 cable wide between it and the Rackum Cay buoy. The reef extends 1 cable from the N. side of Gun cay, marked at its extreme by a buoy striped *black* and *white*, vertically, with the flag-staff of the Apostles' battery in one with the flag-staff of fort Charles W. by N.

New shoal is a very small knoll with 20 feet water on it at about 140 yards southward of Port Royal beach. A buoy striped *black* and *white* lies in $4\frac{1}{2}$ fathoms water, with Kingston church spire over the southeastern extreme of fort Charles beach, the dock-yard clock-tower and fort Charles flag-staff in line, and a conspicuous house on the summit of a distant round hill just open westward of the western extremity of Port Royal point. Between the shoal and beach the passage is clear, and there are 7 fathoms water within 40 yards of the buoy.

New shoal.

Beacon shoal, a similar small rocky head, with 14 feet water on it, lies at about 100 yards SW. of New shoal, and about $1\frac{1}{4}$ cables southward of Port Royal point. A buoy with a *red* triangular beacon 7 feet high is moored in 4 fathoms water on the SW. edge of the shoal, with Kingston church spire over the southeastern extremity of fort Charles beach, and Plum Point light-house in line with the centre of Gun cay. Within 40 yards around it the depth is from 22 to 28 feet.

Beacon shoal.

Harbor shoal is about 40 yards in extent, with $2\frac{3}{4}$ fathoms water on it, and lies NW. by W. 2 cables from Port Royal point. It is marked by a *red* beacon buoy, and close to its S. side the depth is 4 fathoms.

Harbor shoal.

De Horsey patch, with $4\frac{1}{4}$ fathoms water on it, lies with Harbor Shoal buoy S. 1 cable, Port Royal point SSE. $2\frac{1}{2}$ cables, and North Port Royal point NE. by E. easterly $3\frac{1}{4}$ cables.

De Horsey patch.

Port Royal spit is a shoal formed by the submergence of part of the town in the earthquake of 1692. It extends off to the westward a little more than a cable from the centre of the town, with $3\frac{1}{2}$ fathoms water at its extreme and 7 fathoms a little outside it, and is marked by a *red* buoy. The

Port Royal spit.

Reformatory, a conspicuous white house with a flag-staff near it, a short distance northward of Kingston, just open of Gallows point, a low mangrove-point running off from the Palisados, bearing NE., leads close to the westward of it.

South Pelican spit is the northern boundary of the harbor, and is formed by a very shallow sand-bank which runs off $\frac{3}{4}$ of a mile westward of Gallows point, and its western limit is marked by a pile-beacon. These are all the dangers in entering the harbor from the eastward.

Directions for
the east channel.

The bottom of the east channel is generally mud and sand, except for a short distance eastward of Gun cay, where it is mud only. In the harbor it is mud with a little sand except near the shoals, where it is formed of broken coral and sand.

A pilot will be generally found off the E. end of Jamaica. Run along the land about 3 miles off, passing southward of Lamottes bank, and when abreast Cow Bay point, Plum point may be steered for, on nearing which to about $1\frac{1}{2}$ miles a vessel will be in soundings, and the East Middle buoy should be seen $1\frac{1}{4}$ miles to the southward of it. Then bring the flag-staff of the Apostles' battery in line with the flag-staff of fort Charles, bearing W. by N., and run on for Gun cay. The leading mark should be brought on before Plum Point light-house bears N., in case the buoy should be adrift or out of its position.

From this distance a stranger will have some difficulty in making the mark out, and will require the use of a glass. The Apostles' battery is small, and built on the brow of a slightly projecting ridge about two-thirds the way down from the summit of the Salt Pond hill; fort Charles will appear as a long, low, red wall, just rising above the sea, and behind it will be seen the masts of the guard-ship and vessels in the harbor, and to the northward of it the church, dock-yard clock-tower, and extensive range of government buildings. This mark will lead up to the buoy on the N. end of Gun Cay ledge, when steer for Port Royal point, passing between it and the buoy on the New shoal and on either side of the Harbor shoal. Having passed the latter and westward of Port Royal spit, haul up and choose a berth as most convenient.

As the turning at Gun Cay point is rather sharp for long vessels in a strong sea-breeze, they may pass through between Gun and Rackum cays. In this case, when abreast of Lime cay, steer for that narrow opening, and bring the flag-staff of port Henderson, at the northern foot of Salt Pond hill, in one with Port Royal point, which mark will lead through, but the eye should be the guide for mid-channel, and after passing close to the northward of the Rackum Cay buoy, steer on for the point and act as before directed, or pass outside the Beacon shoal and then haul up. Vessels should not pass between the New and Beacon shoals. In a heavy ship it would probably be advisable to pass northward of Gun cay and southward of Beacon shoal.

The most convenient berth for merchant-vessels will be found outside Port Royal spit; they should therefore shorten sail in time after passing the point. English ships of war secure to mooring-buoys off the dock-yard, the buoys being numbered from S. northward.

At night, when about 3 miles off Cow Bay point, the *red* light on Plum point will generally be seen, and it may be steered for. Running for the channel, its western limit should not be passed or the *white* light brought in sight until at about 1 mile from it, in order to clear the East Middle ground, then steer for Gun cay as before. Having rounded the buoy at the N. end of Gun cay, steer about SW. by W. until the light is open of the S. end of Gun cay, bearing E., then alter course to W. by N., which will carry a vessel between the Beacon shoal and West Middle rock, or take the channel northward of the New shoal, passing close round Port Royal point, which is steep-to.

When fort Augusta light bears N. $\frac{1}{2}$ E. a vessel may haul up westward of the Harbor shoal; if a steam-vessel and going on to Kingston, fort Augusta light kept on a N. by E. bearing will lead westward of the South Pelican spits, and when at the distance of half a mile from the light the vessel will be near the edge of the shoal ground on the N. side of the channel, when the course should be altered to about NE. by E., and the mariner should feel his way slowly, guided by the piles. When the *red* light at fort Augusta bears southward of W. steer more to the eastward. Plum Point light

marks the northeastern limits of the shoal ground eastward of the North Pelican spit and westward of Kingston harbor.

If the land-breeze is likely to overtake the vessel before getting through the E. channel, it will be better for a sailing-vessel not to proceed farther to leeward than the Upper White Horses, but to stand off and on until the sea-breeze comes down in the morning. It will be advisable not to be too hasty in bearing up until the sea-breeze is observed to have firmly established itself in the harbor, for the crew will only be worried in bracing about the yards to the conflicting winds.

Kingston har-
bor.

Kingston harbor is a large spacious inlet, running E. and W., formed by the Palisados, and capable of containing many vessels of the largest size. Shoals extend westward and northwestward for 1 mile from Gallows point, and eastward bordering the northern shore of the Palisados at the distance of $\frac{3}{4}$ of a mile to a mile as far as abreast the city, which with the shallow ground on the northwestern shore of the harbor contracts the ship-channel to a very narrow breadth.

This channel lies along by fort Augusta, an extensive fortification on the extremity of a low sandy spit of swampy land on the northwestern side of Port Royal harbor, and is pointed out by pile-beacons on either side, striped *red* and *white* vertically on the northern side, and *red* on the southern. The two outer piles on the S. side are surmounted respectively by a barrel, and triangle base downwards; the next three by triangles base upwards; and the inner pile by a globe. Those on the northern side by a triangle, square, cross, and St. Andrew's cross. There is a *black* beacon, 40 feet high, on the southeast angle of the fort; also two *red* buoys on the S. side of the channel, from fort Augusta ESE. nearly 600 yards, and E. $\frac{1}{3}$ S. $1\frac{1}{4}$ miles. The narrowest part of the channel commences at about 650 yards SSE. from the flag-staff of the fort, and is here 300 yards wide. Farther on, at 700 yards eastward of the staff, the breadth of the channel between the piles is reduced to 200 yards, and the depth 27 feet. Thence it opens out gradually as the vessel advances to the eastward, and the water deepens to 6 and 7 fathoms. Vessels of large draught lie

alongside the wharves of the town, above which the water deepens to 9 and 10 fathoms.

Kingston, the capital of Jamaica, stands on a gentle slope. The streets are regular and straight, running parallel to each other, but mostly unpaved, and during heavy rains some of them are impassable. The houses are of brick, and two stories high, having the front shaded by a piazza below and a covered gallery above. The principal buildings are the English and Scotch churches; the former, standing in a commanding position, is a large structure with a handsome tower and spire; several chapels, two synagogues, an hospital, various charitable institutions, court-house, theatre, workhouse, penitentiary, commercial subscription rooms, jail, &c. The market-place is in the lower part of the town, near the water-side, and fairly supplied. There is also an ice-house, and the supply never fails.

An indifferent light in a single lamp, 40 feet above the sea, is shown from the beacon at fort Augusta, *white* to the S. and W., and *red* to the eastward. Light.

In proceeding from Port Royal to Kingston, the commodore's flag-staff on with a black vertical stripe on the timber-shed, leads southward of the Pelican shoals; the mark to run into the channel is Healthshire or Helshire point just open of Small point, SSW. $\frac{3}{4}$ W., or fort Augusta beacon N. $\frac{3}{4}$ E., until Lindo's house, standing in the interior on the northern shore, comes in one with the lower red-topped house, called old Greenwich hospital, bearing NE. by E., which mark will lead into the narrows. Upon nearing the elbow pile, the upper house must be opened entirely to the left of the lower one; this leads past the elbow in 42 feet; then the two houses may be brought again in line, and when Gallows point comes on with the dock-yard and coal-stores, haul round toward Kingston. Vessels turning through the narrows, and nearing the elbow, should take care not to open Lindo's house to the eastward of the red-topped house at Greenwich, and should not stand into less than 27 feet on either side, as the bank is steep-to. The piles will be a guide, but vessels rarely go up without a pilot. The southern fall of Yallahs hill seen over the sudden rise of the bush on the Palisados leads up the harbor, where anchorage may be taken up as convenient. Directions
from Port Royal
to Kingston.

When leaving Kingston, having passed the pile off Creek pond, a bushy cay (just north of fort Augusta) in line with a large cotton-tree on the low land westward of it leads to the narrows. Sailing-vessels will find it advantageous to shift to the fairway at Port Royal the day previous to departure, so as to quit with the land-wind at early dawn, and to get out well clear of the shoals before the sea-breeze sets in.

East channel.

If bound to windward, the E. channel will, of course, be the best; but it should only be taken by steamers or vessels of handy size, with good sailing qualities, that will insure staying. In this case, should the sea-breeze overtake a vessel after getting to the eastward of Gun cay, she may stand toward the Palisados till the flag-staff of the Apostles' battery is in one with the belfry of Port Royal church, until near Rocky point, when the staff must be kept open to the southward of the belfry to avoid the reef off the point.

Eastward of that point, use the same turning-mark until nearly midway between Middle and Little Plum points, when the staff of the Apostles' battery must not be brought to the northward of the N. part of fort Charles, to clear the shoals off the latter point. When Kingston church bears N. $\frac{1}{4}$ W., do not stand farther to the northward than the flag-staff of the Apostles' battery in line with that of fort Charles, to avoid the foul ground off Plum point.

Standing to the southward toward Lime Cay shoal, do not approach it nearer than to bring the flag-staff at port Henderson just touching Port Royal point; and when standing toward Lime cay, do not come within 400 yards of the N. end. When eastward of it, the high bluff point at the N. part of Green bay, kept open of the N. part of Lime cay, will clear the foul ground to the northward of Maiden rock; and approaching the East Middle shoals, keep the high cliffs at the S. part of Green bay open to the northward of Lime cay until clear of them. It is seldom large ships work through this channel; the capabilities of the vessel and the force of wind and swell should be considered.

South channel.

South channel is a narrow vein of deep water through the close mass of shoals which lie S. and W. of Port Royal, and which extend out 4 miles. It is nearly always used by sail-

ing-vessels leaving at daylight with the land-wind; the buoys on the E. side are *red*, and those on the W. *white*.

West Middle rock is a very small head, with 22 feet water on it, lying directly at the entrance of the channel, SW. 900 yards from Port Royal point, and NNW. $\frac{1}{4}$ W. 450 yards from the buoy on the NW. end of the West Middle ground. On it there is a floating beacon, with a vane of rails on the top, 4 feet square, 30 feet above the sea; the upper part is painted *white*, the lower *black*, and it forms, with the beacon on fort Augusta, the leading mark for this channel.

West Middle knoll, with only 22 feet water on it, lies W. $\frac{1}{4}$ N. 500 yards from the West Middle buoy, and SW. 550 yards from the beacon on West Middle rock. When on the knoll the martello tower near Rock fort is in one with the S. nob on Gun cay; and the beacon on West Middle rock in line with the easternmost cocoa-nut tree on Port Royal point.

West Middle shoal is a coral bank partially covered with a thin layer of sand, and near the centre has as little as 2 feet water on it, steep-to, particularly on the west side. At its NW. end is a *red* buoy with staff and vane, and from it Gun cay is in line with a red patch in the side of the hill at Rock fort about NE. by E. $\frac{3}{4}$ E.; the flag-staff in the dock-yard in line with the military surgeon's house at Port Royal, NNE. $\frac{3}{4}$ E.; and the hole in the bluff at Small point in one with Healthshire hummock WSW. There is a patch with 5 fathoms water on it SSW. 600 yards from the buoy.

Turtle Heads are numerous detached rocky shoals, some nearly awash, which extend to the eastward from Small point. A *red* and *white* vertical striped buoy, with a small staff and vane, is moored in 6 fathoms water, on their outer edge, with Kingston church in one with Rackum cay NE. $\frac{1}{4}$ N., the notch in the mountain open a little to the eastward of the centre part of the largest building in fort Augusta N. $\frac{3}{4}$ E., and the S. extreme of Small point in line with a deep gap in the distant hills WNW. This part of the channel is about 4 cables wide; the leading mark carries just eastward of a shoal with 4 $\frac{3}{4}$ fathoms water on it. Should the buoy be adrift, the dock-yard clock-tower on with the eastern angle of fort Charles will lead half-way between the shoals and the nearest 27-feet knolls.

Drunkenman's cay. The eastern side of the S. channel is pointed out by Drunkenman's cay, a small low islet of stones and sand, on which there are a few bushes. A short distance to the northward of it there is a dry sand-bore, and from thence it is nearly connected to the S. end of the West Middle shoal by a rocky ledge, in some parts dry. A *red* buoy in 6 fathoms lies NW. by N. $\frac{1}{4}$ of a mile from the cay.

South knolls. Nearly midway between Drunkenman's cay and the Turtle heads, on the line of the leading mark, are four small detached heads of hard sand, called the South knolls, on which there are 27 and 30 feet water.

Portuguese shoals. Portuguese shoals are two small banks at the SE. side of the entrance of the S. channel, and about a mile westward of South cays. There are only 6 feet water on the easternmost, 17 to 23 feet on the other, and a *red* buoy with a staff and vane is moored in 5 fathoms water on the western edge, with the remarkable notch in the mountain touching the E. part of fort Augusta N. $\frac{1}{2}$ E., and Healthshire beacon in line with Healthshire hummock W. $\frac{3}{4}$ N.; the beacon is *white*, and close to the beach in Half-moon bay. The channel is here $\frac{1}{2}$ a mile wide, and the W. side is formed by Bush reef, on which the sea generally breaks.

Three-fathom banks. Three-fathom banks are two detached banks lying off the SE. end of Bush reef, at the SW. side of the entrance to the South channel; the outer is SSW. $\frac{3}{4}$ W. $7\frac{1}{2}$ cables from the Portuguese buoy. The least water on the inner bank is 19 feet, on the other 20 feet. Vessels, after passing the Portuguese shoal, should steer well to the eastward and take care not to get to leeward on these banks, or Wreck reef. There are other patches southward of these; the shoalest has 5 fathoms water on it.

Wreck reef. Wreck reef lies about 1 mile off the point of the same name, and SW. $\frac{1}{4}$ S. $4\frac{1}{2}$ miles from the Portuguese shoals. Should the vessel be drifted to leeward and unable to weather this reef, she may run round its N. end and anchor close to leeward of it, to await the land-wind to carry her out again. A shoal, with a depth of $4\frac{1}{2}$ fathoms, lies NE. $\frac{3}{4}$ E. $1\frac{1}{2}$ miles from Wreck reef.

Directions. A vessel leaving by the S. channel should be under sail with the land-wind at day-dawn. If, however, she has good sailing qualities she may leave with the sea-breeze, provided

she can lie up S. by E. Having passed close to the westward of West Middle Rock beacon, keep it in line with the *black* beacon at the SE. angle of fort Augusta and a notch in the Liguanea mountain, N. $\frac{1}{2}$ E.; the latter, however, is difficult for a stranger to recognize, and is frequently obscured.

If of heavy draught, on approaching the South knolls, when a gap in the distant hills comes on with the S. extreme of Small point (which is conspicuous) WNW., keep a little to the westward until the dock-yard clock-tower comes just open of the E. angle of fort Charles, and keep it so till the high or southern end of Drunkenman's cay bears E., when haul up again on the leading mark. When Healthshire beacon bears about W. by N. the vessel will be clear of Portuguese shoals, and may be hauled to the wind, or, if bound westward, continue on the same course clear of the outer shoals of Wreck reef, taking care to keep the Apostles' battery well open eastward of Small point until well to the southward.

A vessel will generally have the assistance of a strong outset as far as Drunkenman's cay, when she will meet the usual westerly stream and heavy swell; therefore should the land-wind fail at this point she had better anchor under the S. end of the cay during the calm which intervenes, sometimes for several hours, between the breezes, in order to avoid being set on the shoals to leeward. By no means run the risk of having to bring up outside the Portuguese shoals. Should the sea-breeze set in before she has cleared the channel and she should be obliged to work out, which is a very hazardous undertaking, except under most favorable circumstances, do not stand farther to the westward than to bring the notch in the mountain on with the centre of a low house in fort Augusta, nor to the eastward than to bring the notch on with the E. end of that fort.

Steamers or persons well acquainted with the locality may venture, in a case of necessity, to enter by this channel; but it will be attended with some risk, especially if the mountains are clouded.

Soundings extend for 4 miles to the southward of the cays, and the edge is very steep, there being in places only 14 fathoms water at a cable within the 100-fathom line. In the

fairway of the channel the bottom is generally composed of mud and sand, and occasionally clay, but near the reefs it is sand, with portions of broken coral.

Supplies. Water, coal, and provisions may be obtained at both Kingston and Port Royal at reasonable prices.

Tides. It is high water, full and change, at Port Royal dock-yard at about 11^h 0^m, and the rise and fall is from 10 to 11 inches. There is no regular tidal stream, but in general there is an outset from the harbor and through the S. channel at the rate of $\frac{1}{4}$ to 1 knot an hour, until as far as Drunkenman's cays, where it takes a more westerly direction, and generally increases in strength. Sometimes it will be found running in this direction at the rate of $2\frac{1}{2}$ knots. A good offing should therefore always be obtained before shaping a course to the westward.

When the land-breezes have been strong, and light southerly winds have prevailed during the day for a short period, it often occurs that the current is running to the eastward in the morning, even as far as the East Middle shoals, when it takes a more southerly direction, and to the southward of the shoals it will be found setting to the SW. or WSW., the strength quite depending on the force of the wind that has been blowing.

Portland bight. The high land of Healthshire terminates at Polink point, about 7 miles to the SW. of Small point. Thence the coast trends to the NW. and sweeps round to the southward, forming between it and Portland point, 12 miles SW. by W., an extensive bight 8 or 9 miles deep. The shore is skirted by small islets and detached reefs, within which are several excellent anchorages for vessels of moderate draught. The outer part of the bight is also protected by numerous reefs and small low wooded cays, with channels between them capable of admitting vessels of the largest draught. The best channel to enter by is between Pelican and Bare Bush cays, through which a vessel will carry from 6 to 8 fathoms water.

Pelican cays. About 3 miles from the northern shore of the bight are two small low bushy islets, called Pelican cays, nearly $\frac{1}{2}$ a mile apart NNW. and SSE., which lie near the centre of a rocky ledge, 3 miles in length E. and W., and 1 mile in breadth. The ledge generally shows itself, and the W. end

is dry and steep-to. In the channel to the northward of it the depth is only 3 fathoms.

Bare Bush cay lies S. by W. $\frac{1}{2}$ W. $2\frac{3}{4}$ miles from the Big Pelican, and rises 800 yards within the NE. end of an oval-shaped coral bank of the same name, 2 miles in length NE. and SW., and 1 mile in breadth, nearly dry and steep-to.

Morris shoal, which lies W. by N. $1\frac{1}{2}$ miles from Bare Bush cay, is a coral knoll with 4 feet water on it, about 1 cable in extent, steep-to, with a clear channel about $\frac{3}{4}$ of a mile wide between it and Bare Bush bank, and also between it and the NE. end of Portland reef, 1 mile SW. of it. On the eastern side of the shoal is a *black* buoy in 6 fathoms with Bare Bush cay bearing E. by N. $\frac{1}{4}$ N., and Portland cay seen between Half-moon cays SW. $\frac{1}{4}$ S.

Portland reefs are $3\frac{1}{2}$ miles in length NNE. and SSW., and about 2 miles in breadth. The inner or SW. edge lies about a mile eastward of Portland point, but in the channel between there is a depth of only 2 fathoms. Half a mile within the SW. end of the reef is Portland cay, a small bushy islet, and about 2 miles NNE. of it are two more similar cays, called the Half-moon cays, $\frac{1}{2}$ a mile apart NE. and SW., and lying $\frac{1}{2}$ a mile within the NE. point of the bank, which generally breaks in most parts.

Portland reefs.

Pigeon island, the largest of the outer group, lies $1\frac{1}{2}$ miles westward of the W. end of the Pelican reef, and NW. $\frac{1}{2}$ W. $3\frac{1}{4}$ miles from Bare Bush cay. It is low and steep-to on its E. and S. sides. The NW. side forms a small bay, off which there is anchorage in 7 or 8 fathoms water.

White shoal is a small detached knoll, with $2\frac{3}{4}$ fathoms water on it, steep-to, lying N. $\frac{3}{4}$ of a mile from Pigeon island, W. $\frac{1}{2}$ N. 3 miles from Little Pelican, and with the S. side of Round hill just open of Brazaletta hill. A *black* buoy in $4\frac{1}{2}$ fathoms lies on the eastern side of the shoal, with the W. end of Little Half-moon cay just open of Pigeon island bearing S. $\frac{1}{2}$ W. and Little Pelican cay E.

Vessels bound into Portland bight should have the assistance of a pilot. If coming from Port Royal, having passed well to the southward of Wreck reef, edge to the westward until the N. peak of Brazaletta hill bears W. by N. $\frac{1}{2}$ N. This hill cannot well be mistaken, being the northernmost of two remarkable elevations on the western range of mount-

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ains, about 800 feet high, with a deep gap or valley between. Steer in upon this course, and, as the vessel advances, Pigeon island will be seen from aloft on the same line of bearing. The S. extreme of this island in line with the N. peak of Brazaletta hill W. by N. $\frac{3}{4}$ N. leads through between Pelican and Bare Bush reefs, and 2 cables southward of a $4\frac{1}{2}$ -fathom patch lying S. by W. $\frac{3}{4}$ W. $1\frac{1}{8}$ miles from Big Pelican cay.

Old Harbor.

If bound to Old Harbor, which is the northernmost anchorage in the bight for vessels of moderate draught, being between Pelican and Bare Bush cays, a remarkable hummock will be seen on the northern ridge of mountains, something in the form of a jockey's cap, called Cudjoe hill. When this hummock comes in line with the base of the western slope of the hill at the E. end of Goat island, N. $\frac{1}{2}$ W., haul up with this mark, and it will lead to leeward of the dry reef at the W. end of the Pelican bank, and between it and White shoal, in $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms water. When the northern Pelican cay bears E. $\frac{1}{2}$ S. steer NW. by N., so as to pass about $\frac{1}{2}$ a mile to the SW. of Careening cay. When abreast the latter cay, the wharves of Old Harbor will come in sight and will direct a vessel to an anchorage off them in $4\frac{1}{2}$ or 4 fathoms, between Careening island and the NE. end of the reef which fronts the western shore and generally shows itself.

Longs wharf.

If bound to Longs wharf, which is nearly 2 miles to the SW. of Old Harbor, having entered the channel as before, and brought the S. side of Round hill (the southernmost of the two hills mentioned before) just open of Brazaletta hill, which mark leads on the White shoal, round the latter gradually to the northward, and bring the upper house at Longs wharf in one with the N. end of the gap or flat open space in the mountains, NW. $\frac{1}{2}$ N. This mark will lead through the best opening in the reef in 4 fathoms, which is here a mile from the shore, and when within it anchor, as most convenient, in $3\frac{1}{2}$ or 3 fathoms water.

Salt river.

Salt river is about 4 miles to the southward of Longs wharf. The entrance to the anchorage lies between Long and Salt islands, which are 1 mile apart. The former is about $\frac{1}{2}$ a mile from the shore, and bordered by a reef on the E. side to the distance of 800 yards. The latter lies about $\frac{3}{4}$ of a mile from the shore, and is steep to a cable off

on the N. and E. sides, but is foul on the S. side to the distance of 400 yards. There is a narrow channel between it and the foul ground skirting the shore to the westward, but it is better to take that to the northward, which is $\frac{1}{2}$ a mile wide.

If bound to Salt river, having entered the Pelican channel and being abreast the cays, it will be better to shape a course so as to pass round the S. end of Pigeon island, which is steep-to. Thence a NW. course $3\frac{1}{2}$ miles will lead to abreast of Salt island. Round its N. end at the distance of about 400 yards, steer down for the entrance of the river, and anchor off it in 3 fathoms water, with the S. side of Pigeon island just in sight to the southward of Salt island. Pigeon island, however, is so low that in a small vessel this mark must be watched from aloft. Large vessels will find a well-sheltered anchorage in 5 fathoms, close up under the NW. side of Salt island.

Peake bay is about $1\frac{1}{2}$ miles southward of Salt island, between Rocky Point reef and other reefs, which generally show themselves about $\frac{3}{4}$ of a mile to the southward of it. It is $1\frac{1}{2}$ miles deep, but being open to the eastward, with strong sea-breezes, a heavy swell rolls in. The best holding-ground will be found in $3\frac{1}{2}$ or 4 fathoms water, under the northern sandy shore, about a mile within the outer part of the reefs. The entrance bears W. $\frac{1}{2}$ N. $3\frac{1}{2}$ miles from Pigeon island.

Peake bay.

West Harbor is an extensive shallow bight on the N. side of Portland ridge, in which there is a depth of only 8 or 9 feet. The channel is half a mile in breadth, and lies between the reefs (which are dry in places) that form the S. side of the entrance into Peake bay and those which extend off $\frac{1}{2}$ a mile from the NE. point of Portland. The only anchorage for vessels of large draught is just to the westward of the northern reefs in from $5\frac{1}{2}$ to 4 fathoms water, where the holding-ground is good.

West Harbor.

Vessels should leave either of these anchorages with the land-wind at early dawn, in order to get clear of the outer reefs before the sea-breeze arrives; should it, however, overtake them before they get to the eastward of Pigeon island they may work out in moderate weather either to the northward or southward of it; the former will be the best route,

Directions.

as the water will be smoother. In this case do not stand too far to the southward, and attend to the mark already given for White shoal.

Goat island and Cabrietta point may be approached by the lead, not coming within the depth of $4\frac{1}{2}$ or 5 fathoms. Should it blow hard it will be better to anchor under the lee of Pelican reef until the breeze lulls or the land-wind comes off; but if intending to proceed on, pass out between Bare Bush reef and Morris shoal, and the leading mark for the northern channel answers the purpose here, viz, Cudjoe hill on with the fall of Goat Island hill. It leads, however, so close to the W. side of the reef, that when the Half-Moon cays come in one (which is the mark for the SE. end of Morris shoal) it will be better to edge a little to the westward, bringing Cudjoe hill open of the fall of Goat Island hill, until the vessel is to the southward of the reef, or the southern Half-Moon bears W., when she may be hauled to the wind.

If unable to lay through and the sea is smooth enough to allow of working out of the Pelican channel, in standing toward Morris shoal do not bring Bare Bush cay to the southward of ESE.; and in approaching the Pelican reef do not open the fall of Brazaletta hill to the northward of Pigeon island. A vessel may stand toward the white water off Bare Bush cay to the depth of 5 fathoms, remembering the $4\frac{1}{2}$ fathoms patch between Bare Bush and Pelican cays.

Portland.

Portland is a ridge of flat wooded land, of moderate height, about 7 miles in length in a W. by N. $\frac{1}{2}$ N. and E. by S. $\frac{1}{2}$ S. direction, $2\frac{1}{2}$ to 3 miles in breadth, and when seen from the eastward has the appearance of an island. The 100-fathom line is 11 miles from this part of the shore, and it may be approached in the day-time to the depth of $6\frac{1}{2}$ fathoms, at $1\frac{1}{2}$ miles off. A vessel bound to leeward, however, must be careful to keep the land of Portland to the northward of W. to avoid the cays and reefs just described, which are somewhat hidden by the eastern point. The current generally sets strong to the westward, and although the soundings are regular a vessel at night should not come within the depth of 12 fathoms.

Rocky point.

Rocky point, about W. by N. $\frac{1}{2}$ N. 6 miles from the S. point of Portland and the W. end of the table-land of the

same name, is foul to the distance of $\frac{3}{4}$ of a mile to the SW. A bank called Robertson shoal extends westward and north-westward of the point for a little more than 1 mile, 6 feet being the least water on it.

Carlisle bay lies immediately to the northward of Rocky point, and for small vessels is sheltered with the usual breezes as far round as SE. Anchorage will be found off the wharf, on about a NE. bearing, and Rocky point about SE. by E. $\frac{3}{4}$ E. in from 4 to 5 fathoms water. A shoal with 2 fathoms water skirts the shore about $\frac{3}{4}$ of a mile off. Westward of Robertson shoal in $5\frac{3}{4}$ fathoms is a *red* buoy with staff and ball, with the wharfinger's house bearing N. by W. $\frac{1}{4}$ W. and Rocky point E. by N. $\frac{1}{4}$ N.

Carlisle bay.

Entering Carlisle bay, Robertson shoal should not be rounded until Kemp hill is open W. of the wharfinger's house bearing N. $\frac{1}{2}$ W., when the vessel may haul up NW. by N. and anchor according to draught.

The coast from Carlisle bay sweeps inward with a deep bend to the NW. as far as Alligator point, which bears W. by N. 18 miles from Rocky point; soundings on this part of the coast are irregular, and the depth of 5 fathoms may be found 7 miles from the shore; Milk and other rivers empty themselves in this bight.

The coast from Milk river entrance trends nearly W. 9 miles to Alligator point; between Milk river and Alligator hole, at $2\frac{1}{4}$ miles to the westward of it, the shore is composed of red and white cliffs 50 feet high, thence to Alligator point there is a sandy beach.

Three and a quarter miles westward of Alligator hole there is a small stream named Gut river, which may be recognized by a remarkable bare space on the steep rising ground over it.

Alligator point is 30 feet high, and from it the land rises to a height of 2,000 feet at a distance of $2\frac{1}{2}$ miles in a northerly direction.

Brune bank is about 1 mile in extent, and rocky, with $4\frac{1}{2}$ fathoms on its shoalest part; lies SW. $9\frac{1}{2}$ miles from Milk river and SSE. 8 miles from Alligator point.

Brune bank.

The edge of the bank of soundings lies 17 miles southward of Milk river and 14 miles southward of Alligator point;

there are depths of 20 fathoms near the edge, and no bottom at 100 fathoms close to outside.

Alligator reef is about 1 mile long ENE. and WSW., and is dry in places. It is situated $2\frac{1}{2}$ miles to the southward of Alligator point, and should be given a wide berth at night, as 9 and 10 fathoms near its outer edge (which is steep to) are the uniform depths at that distance from the coast. Between the E. end of the reef and Alligator point (which may be passed within $\frac{1}{2}$ a mile) there are 5 to 7 fathoms.

Alligator Pond
bay.

Between Alligator point and Little Pedro point, $3\frac{1}{4}$ miles W. by N. $\frac{1}{2}$ N. from it, lies Alligator Pond bay. The shore of this bay, for a distance of $2\frac{1}{4}$ miles westward of Alligator point, is rocky, with low cliffs, thence to Little Pedro point sandy beach, the land behind rising precipitously to 800 feet.

Anchorage.

The anchorage in Alligator Pond bay is in $4\frac{1}{2}$ fathoms, (mud bottom,) about $\frac{1}{2}$ a mile from the wharf, near the centre of the bay. It is sheltered from the eastward by Alligator reef, but with westerly and southwesterly winds a heavy swell rolls in, when the shore should be cautiously approached on landing, so as to pass close to leeward of some rocks that lie in the same line of direction as the wharf, at a distance of 100 yards.

Little Pedro point, 20 feet high, is a rocky ledge projecting 200 yards from the shore, the land behind rising suddenly 900 feet, thence gradually to 1,670 feet at a distance of 2 miles N.

The coast from Little Pedro point forms a small bay to the westward in which there is an indifferent landing; thence it trends nearly W. $7\frac{3}{4}$ miles to Pedro bluff. About 3 miles W. of Little Pedro point lies Cutlass point, and midway between them there is a large, whitish, triangular spot, (named the White Horses,) at a height of 600 feet, on the cliffs, which rise 1,000 feet nearly perpendicular from the sea; $\frac{1}{2}$ a mile westward of the White Horses there is a remarkable white spot 500 feet above the sea.

The land over Cutlass point rises abruptly 1,750 feet, thence gradually 2,400 feet to mount Bellevue, at $2\frac{1}{4}$ miles northward of Cutlass point; between this point and Pedro

bluff the coast curves slightly to the northward, forming Jack's hole.

A rocky ledge, awash, fringes the coast between Little Pedro point and Pedro bluff, except under the White Horses.

Pedro bluff is a prominent headland, rising abruptly 220 feet from the sea and sloping to 70 feet at $\frac{2}{3}$ of a mile in-shore, whence the land again rises gradually to 1,780 feet northward of the bluff.

Pedro bluff.

From the edge of the bank of soundings, at 6 miles south of Pedro bluff, there are depths of 20 to 17 fathoms 3 miles in a northerly direction, thence 26 fathoms to within 1 mile of the shore, where there are 20, decreasing to 17, 12, and 8, with 6 fathoms close to Pedro bluff.

Pedro bay, in which temporary anchorage may be obtained in $4\frac{1}{2}$ fathoms, (sand and mud,) is situated on the west side of Pedro bluff; there is occasionally a heavy swell in this bay, especially after a continuation of easterly or southeasterly winds, when the depth of water in the bay decreases 2 or 3 feet. Landing is not at all times good.

Pedro bay.

The coast from Pedro bay trends NW. $\frac{1}{4}$ W. $3\frac{1}{2}$ miles to Black Spring point, with several indentations, the largest of which is Frenchman bay. This part of the coast is reef-bound, with the exception of one or two passes known to fishermen and to the pilots residing along the coast, who look out for vessels making the pilot-signal.

From Black Spring point, which has on it a low sand-heap, the land rises 500 feet to Sand Hill range, at a distance of $\frac{3}{4}$ of a mile to the northeastward.

Starve Gut bay is situated about midway between Black Spring point and Parattee or Sand Hill point, 4 miles NW. by W. $\frac{1}{2}$ W. from it; a ledge of reefs awash extends around the shore of this bay, except in the NE. part, where there is a small sandy beach, from which a morass commences, and extends between the sand-hills (30 to 40 feet high) that fringe the coast-line and Sand Hill range to beyond Black River.

Starve Gut bay.

Starve Gut bay affords a temporary anchorage in 4 fathoms half a mile from the shore, and is used occasionally by small vessels bound to the eastward when unable to work

Anchorage.

against the current, which, after a continuation of easterly winds, sets from 1 to $1\frac{1}{2}$ knots an hour to the westward.

Parattee, or Sand Hill point, from which the coast trends N. $\frac{1}{4}$ W. to Black river, is low, having on it a few palm-trees. The coast-reef projects $\frac{3}{4}$ of a mile westward from this point, and extends in a northerly direction as far as the line of reefs that protects the anchorage off Black river.

About 4 miles South of Cutlass point the outer edge of a deep commences, and extends to the westward nearly parallel with the shore; in the eastern part of this deep, which is 2 miles broad, there are 20 fathoms, deepening to 29 fathoms abreast Black Spring point, where the breadth is 1 mile. Between the deep and the edge of the bank of soundings there are 22 to 19 fathoms; at 7 miles S. of Parattee point there are 20 fathoms on the edge of the bank, and no bottom at 100 fathoms close to the southward.*

From Parattee point the shore takes a N. by W. direction for 5 miles to the entrance of Black river, and thence W. for 5 miles to Luana point, forming a bay full of dangerous banks, the principal of which are Raviant reef with 2 feet least water; Barrack shoals with 12 feet; and Long shoal with from 5 to 12 feet. To clear them a vessel should not come within the line of the above points, and should keep Pedro bluff well open of Parattee point, which is foul for more than a mile.

Black river.

With Luana point bearing N. about a mile, the mark for entering Black river will be the church a little left of the N. shoulder of Santa Cruz mountain, E. by N.; steer in on this mark till Malcolm point bears N., when the course to the anchorage is E. $\frac{3}{4}$ S.; this is the only safe channel for vessels drawing over 10 feet; coasters use the passages between the Barrack and other reefs. Small vessels anchor off the town in 3 fathoms, with the church NNE. about 7 cables; those of heavy draught farther out.

Working in, do not approach the Luana or Jew reefs nearer than to bring Moco bluff in line with the N. end of Santa Cruz mountains, and standing toward Ravient shoal do not open the barracks northwestward of the same range.

* The description of the coast between Milk and Black rivers is by Lt. T. F. Pullen, R. N., Admiralty Surveyor.

The holding-ground is very good ; pilots can always be obtained ; the rise of tide is slight.

From Luana point the shore trends in a NW. direction, with a slight curve inward, for $7\frac{1}{2}$ miles to Crab Pond point, and is free from danger ; but thence as far as St. John point, which bears from it W. by N. $\frac{1}{2}$ N. $12\frac{1}{2}$ miles, it is foul, and skirted by reefs and shallow rocky ledges to the distance of from 1 to $2\frac{1}{2}$ miles. The coast between these two points sweeps round into a deep bight, in which are the anchorages of Blewfields and Savanna-la-mer.

Blewfields, about $2\frac{1}{2}$ miles northward of Crab Pond point, may be known by the church, school-house, and the buildings on a large estate. The anchorage is within the rocky ledge, which lies about $1\frac{1}{2}$ miles from the shore, and has a depth across it of $3\frac{1}{2}$ to $4\frac{3}{4}$ fathoms. Luana point just open leads westward of it.

Blewfields.

Water may be obtained at a small stream in Blewfields bay, but a more convenient place will be found round the bluff, at the N. end of the bay.

Standing in for the anchorage keep the Overseer's house in line with the southern and lowest part of a deep hollow in the mountain bearing ENE., which leads across the ledge in $3\frac{1}{2}$ fathoms. As the water is very clear any dark spots may be seen and avoided. When the ledge is crossed keep to the northward with the Wesleyan chapel about NNE. for the anchorage in about $5\frac{1}{2}$ fathoms. Vessels of large draught may anchor close to the W. side of the ledge in 9 or 10 fathoms, but it must be approached cautiously under easy sail, as the ledge is steep-to. The land in this neighborhood is lofty, and $2\frac{1}{2}$ miles inland rises to the height of 2,000 feet.

Directions.

Savanna-la-mer may be readily distinguished by the town, which stands on the shore of a low and flat plain of considerable extent. The ridge of hills bounding this plain on the N. is very remarkable, and one of the peaks, called the Dolphin head, 3,450 feet high, also serves as a guide to the locality. The anchorage is formed by a line of reefs running along shore and abreast the town, about $1\frac{1}{2}$ miles off, with channels between them.

To enter by the weather channel bring the E. side of Dolphin head in line with a large cotton-tree, (to make it con-

Directions.

spicuous a large ball has been placed on it,) to the eastward of the town, N. by W., on which line a vessel will carry 19 or 20 feet water, and as soon as she is within the reefs she can anchor in that depth; but the cut is so narrow that it is only used by small vessels with the aid of a pilot and a leading wind. At $1\frac{1}{2}$ miles westward of this cut is the lee channel, 1,200 yards wide, with a depth of 4 fathoms; but there is a coral head with only 6 feet water on it just westward of mid-channel. Great breaker, forming the lee side of the entrance, always shows. To enter, bring the town to bear NNE. $\frac{1}{4}$ E., steer in on that course between the reefs, and when within haul up for the anchorage in about 4 fathoms. A stranger should take a pilot.

If a berth is taken up outside the reef, be very careful in approaching as it is steep-to. With a strong trade this anchorage is by no means desirable, and risk will be run of losing an anchor. The extreme elbow of the weather reef does not show itself, has 3 fathoms on it, is steep-to, lies S. by W. $\frac{1}{2}$ W. 2 miles from the centre of the town, and E. $\frac{1}{2}$ S. $4\frac{1}{2}$ miles from St. John point. From Great breaker the shallows extend toward St. John point, and are there a mile off shore. To the westward of that point, as far as South Negril, WNW. 10 miles distant, the shore is bold and steep-to.

The W. side of the plain of Savanna-la-mer terminates a short distance NW. of St. John point, and from thence to South Negril point the land is of moderate elevation.

Banks.

There are at least two outlying banks off the SW. coast of Jamaica, but their limits have not been accurately traced. One lies W. about 11 miles from Pedro bluff, and has from 16 to 24 fathoms on it over sand and coral. The other lies W. by N. $\frac{1}{2}$ N. about 20 miles from the bluff, and SSE. 15 miles from Savanna-la-mer, and has from 12 to 20 fathoms water on it.

Negril bay.

South Negril point, the extreme W. end of Jamaica, is bold, round, rocky, and steep-to, and between it and North Negril point, which bears N. by E. 6 miles, the shore recedes and forms Negril or Long bay, about $1\frac{1}{2}$ miles deep. The edge of soundings runs nearly N. from the former point, and extends out about 2 miles from the head of the bay.

A reef partly dry, on which the sea always breaks, and upward of a mile in length N. and S., lies N. by E. nearly 3 miles from South Negril point, and nearly 1 mile off shore, and there is shallow anchorage within it. Soundings extend nearly a mile to the westward of the reef, the depth increasing suddenly, about half-way out, from 5 to 12 fathoms. There is anchorage on indifferent holding-ground about 1 mile to the northward of South Negril point in 4 or 5 fathoms water, with it bearing S. by W., and the westernmost butts on the beach (which are nearly 2 miles within the point) SE. $\frac{1}{2}$ E.

Booby cay lies $\frac{1}{4}$ of a mile off shore, about $1\frac{1}{2}$ miles to the southward of North Negril point, and the coast between forms a small bay, called Negril harbor, which, however, is seldom visited even by droghers, and cannot be recommended as a safe anchorage. The ground, both northward and westward of the cay for half a mile, is foul with rocky heads.

From North Negril point the coast, which is bold and steep-to, takes a NE. direction for 9 miles to Pedro point, a bold, prominent cliff which forms the NW. extreme of the island, and is somewhat similar to Pedro bluff. A mile eastward of the former point is Orange bay, and a little farther to windward Half-moon bay, which afford temporary shelter.

Green Island harbor is a small cove about $2\frac{1}{2}$ miles NE. of Orange bay. It is about $\frac{3}{4}$ of a mile deep, and little more than a cable wide between the reefs which skirt the shore on either side of the entrance, and is only fit for vessels of light draught. Being open to the northward, a heavy sea rolls in with these winds, bringing in sand, which is said to be gradually filling it up.

Standing in for this harbor, bring a conspicuous house on the high land at its SW. corner to bear SSE. $\frac{1}{4}$ E.; on this line a vessel will carry a depth of $5\frac{1}{2}$ fathoms between the reefs, and being within them she may anchor according to draught. The soundings gradually decrease toward the shore, and with the inner wharf on the eastern side bearing E., the depth will be only 15 feet; within this it shoals rapidly to 9 feet, with the fort on the W. point bearing W.

Davis cove is a temporary anchorage for droghers, lying

Green Island
harbor.

Directions.

about $2\frac{1}{2}$ miles NE. of Green island. All this part of the shore, with the exception of the immediate vicinity of Green island, which is low and surrounded by reefs, being bold and steep-to, a vessel may stand to within a mile of it.

St. Lucea.

St. Lucea harbor, nearly 4 miles eastward of Pedro point, although of small dimensions, is one of the best harbors on the N. side of Jamaica. Its entrance is about 3 cables wide, but, within, it sweeps round into a most picturesque basin about $\frac{3}{4}$ of a mile in diameter, capable of receiving vessels of the largest size. Its position may be readily recognized by the fort, church, and barracks, which stand near each other on the western side of the entrance. From an offing it will be found by bringing the Dolphin head to bear about S. $\frac{1}{4}$ E.

Lucea point is a low, rocky headland, skirted by a ledge for half a cable, and the eastern shore within it, as far as Cane point, is also foul to the distance of 1 cable. A reef, which breaks, runs off SE. by E. 1 cable from the fort on the western side; the western shore is also foul to about the same distance.

Hospital reef.

Hospital reef extends about 2 cables to the northward of point Antonio; the great house at point Estate, touching the southern cliffs of Lucea point, bearing E., leads northward of it.

Directions.

Approaching St. Lucea from the westward, there is no danger except the Hospital reef; but in running down from the eastward, keep a good offing until past Buckner's reef, which lies about $\frac{1}{2}$ a mile from the shore and $2\frac{1}{2}$ miles eastward of the harbor. Marly Hill house, shut in by the fort, clears Honeycomb reef, but there is no object in rounding Lucea point closely. Having opened the harbor, steer in mid-channel, and when the court-house comes open of Marly hill, edge away to the SW. and anchor as convenient. A good berth for a heavy ship is with the fort bearing NNW. and the court-house in line with the Baptist chapel W. by S. in $5\frac{1}{4}$ fathoms water. Farther eastward a vessel will be exposed to northers, which at times send in a heavy sea. Vessels loading may go as far in as to bring the fort N. $\frac{1}{2}$ E. in $3\frac{1}{2}$ or 4 fathoms water. The bottom is mud. Should a vessel have to work out, in standing toward the eastern shore, do not go farther than to bring the house on

Barbara hill in line with a house above it on Thorn hill ; but tack short of this line, especially near Cane point, as it leads close to the coral bank.

Supplies are good, and water may be procured from the town, or at a well to the northward of Georgia river on the E. side of the harbor, at from 4 to 2 shillings per ton.

Mosquito cove, about 3 miles to the eastward of St. Lucea, is a narrow, well-sheltered inlet, capable of receiving vessels of large draught. It is about a mile in length N. and S., but at its entrance between the reefs, which skirt it at a short distance on either side, it is little more than half a cable wide ; it, however, gradually widens within, and at its inner end forms a basin about 3 cables in diameter, in which the depth is from 3 to $2\frac{1}{2}$ fathoms. A vessel will sail in with the sea-breeze, but as no marks can be given, and the cove being so narrow, the assistance of a pilot will be required. In approaching, avoid the Buckner's reef, which lies about $\frac{3}{4}$ of a mile NW. of it at a long $\frac{1}{2}$ mile from the shore, with a channel of 6 fathoms within it. A vessel may pass round either end of this reef, and soundings will be found $\frac{1}{2}$ a mile outside it.

Mosquito cove.

Great river discharges itself into a small bay at about a mile to the eastward of Round hill bluff, a remarkable bold, wooded headland, about $5\frac{1}{2}$ miles to windward of Mosquito cove, and the same distance to leeward of Montego bay. It is protected on the N. by a reef, within which there is anchorage for two or three vessels of moderate draught. In the event of being caught by a norther in the bight of Montego bay, and not able to fetch that anchorage or weather Round hill bluff, which is foul for nearly $\frac{1}{2}$ a mile off, a vessel may run for this place as a last resource by observing the following directions :

Great river.

Being off the anchorage, steer in for it on about a SSW. bearing, and having made out the point of the reef, which shows itself, pass close round it, leaving it on the port hand ; then luff up, shorten sail, and anchor immediately the vessel is head to wind, as near the reef as possible, as there will be only room to veer out 100 fathoms, and be in 3 fathoms. It will perhaps be safer to drop both anchors at once, to prevent dragging. The river is navigable for flat-bottomed boats to a considerable distance.

Directions.

Montego bay.

From Round hill the shore continues its easterly direction for 5 miles, then bends suddenly to the northward for 3 miles, terminating in a low, gradually rounding point, which may be said to form the N. end of Montego bay. The head of this bight is filled with low mangrove-cays, skirted by reefs to the distance of a $\frac{1}{4}$ of a mile, almost wall sided, with 20 fathoms water at about 100 yards off. To the northward of the cays the low shore, on the N. end of which will be seen the town, sweeps round with a slight inward curve, forming the bay, which between the reefs is nearly $\frac{3}{4}$ of a mile wide N. and S., and from the town to the edge of soundings about $\frac{3}{4}$ of a mile deep.

The N. and E. sides of the bay are also foul to the distance of 400 yards, and in the NE. corner there is a small, secure cove formed by a break in the reef, capable of holding ten or twelve vessels. The anchorage in the bay is quite safe during the period of the ordinary land and sea breezes, which range from NNE. to SE.; but between November and March, when northers sometimes blow in accompanied by a heavy sea, a second anchor may have to be dropped, and accidents have occurred.

Directions.

Montego bay being an open roadstead there is no difficulty in getting to the anchorage, except from its generally crowded state, especially from December to June. Approaching it from the eastward, run down along the shore at the distance of about 2 miles, hauling gradually round the reefs, in 9 or 10 fathoms, which may almost be skirted by the eye, the water is so clear. Having passed to the westward of the point, haul to the southward along the reef, and when the church comes open bearing ESE. the vessel will be southward of the southwest part of the northern reef. Anchor as most convenient, with Sandy point, which is a little northward of Old Fort point, shut in. Sandy point just open of Old Fort point leads along the edge of the bank, which is steep-to. A good berth will be with the church from E. to E. by N. and Old Fort point N. $\frac{1}{2}$ W., in $10\frac{1}{2}$ fathoms water. In winter the farther to the northward the berth is taken the better, as the vessel will get the protection of the reef, but the holding-ground is not so good. In anchoring be prepared to veer out a good scope of cable at once, or the vessel may drag off the bank.

The coast from Montego bay takes an E. by N. direction for 6 miles to Duns point, the N. extreme of Jamaica; it then trends a little southward of E. for 10 miles to Falmouth. This part of the island, as far eastward as St. Ann, is generally low, highly cultivated, and backed by hills of moderate elevation. In beating up from Montego bay, the set of the current should in the first place be found, and taken advantage of accordingly. Should there be none, keep the shore aboard during the evening, which may be done without fear, to catch the land-wind. If it is found more advantageous to seek an offing, the mariner will find a good guide as to his progress to windward in the peak of Turquino, the highest and most remarkable mountain on the S. side of Cuba, and generally visible.

Falmouth or Martha Brae is a reef harbor capable of receiving a small number of vessels not drawing over 16 feet, moored head and stern, and may be readily known by the public buildings of the town, which fringes the beach and is of considerable extent; the channel, however, although buoyed, is so extremely narrow and intricate that for a vessel of over 10 feet draught, a pilot (who may always be found in the offing) is indispensable. The buoys on the bar frequently break adrift; some of the inner shoals are marked by beacons; the reefs will be known by the color of the water. Another evil is that a vessel can only leave with the land-wind, and in the winter season this is frequently interrupted for many days.

The entrance, about 130 feet in width, is marked on each side by a *green* buoy with *red* and *white* staff; almost in mid-channel there is a patch with 22 feet water on it; within, the depth increases to 7 fathoms, and the channel lies between the *red* beacons, after which a berth must be taken where the shipping affords room.

A square white patch in the middle of a dark-looking gable of a house just open eastward of the court-house SW. $\frac{2}{3}$ W. is the leading mark for the channel, but local knowledge is required.

Water is easily obtained at Falmouth, being conveyed by pipes to a fountain standing some yards from the shore, where two or three boats can fill alongside at the same time; other supplies are obtainable.

Rio Bueno empties itself into a small bay about 12 miles eastward of Falmouth, in which there is indifferent anchorage for small vessels; it will be known by the church and houses round it.

Dry harbor, about 3 miles farther eastward, affords somewhat better shelter; its entrance, however, is narrow, and the depth only 16 feet.

St. Ann bay.

St. Ann bay, about 10 miles eastward of Dry harbor, may be recognized by the houses, by the church and court-house, standing close together, and by a large waterfall about 3 miles eastward of the town. It is protected on the N. by a reef, through which there is a deep cut only 90 yards wide, which shoals suddenly from 11 to 4 fathoms on either side, leading into a small basin, about $\frac{1}{4}$ of a mile in diameter, with a depth of 5 and 6 fathoms, and with a small arm to the westward fit for droghers.

The leading mark for the channel is the easternmost road to the town kept end on, bearing about S. When within the reef, anchor as convenient. A pilot, however, is necessary, and it is not a safe place for vessels of large draught.

Ocho Rios bay.

Ocho Rios bay is about 5 miles eastward of St. Ann, and partially sheltered by reefs easily seen, which run off from the E. side. It is easy of approach, and the best berth is in 7 fathoms water within the reef, with the W. end of it bearing about NNE. and the landing-pier ESE. The bay is open to N. and NW. winds. Bull point, at the W. end of the bay, is a remarkable rocky knob, 30 feet high. About NW. $\frac{3}{4}$ N. 1,600 yards from it is a patch of $4\frac{1}{2}$ fathoms water, and which should be avoided. Two and a half miles eastward of Ocho Rios is White River bay, and 3 miles farther is Rio Novo bay.

Ora Cabeza bay.

Ora Cabeza, or Cabica bay, about 4 miles eastward of Rio Novo, is also an anchorage for small vessels, but exposed to the northward. Its vicinity is found by bringing the western ridge of the Blue mountains to bear SSE., which will lead up to the point. In entering, give the small reef on the E. side of the bay a berth, and when the western bluff point bears W. or W. by N., a vessel may anchor in $5\frac{1}{2}$, 6, or 7 fathoms water.

Galina point, $3\frac{1}{2}$ miles eastward of Cabica bay, is low but steep-to. The land rises gradually from the point, and at

2 miles within forms a remarkable round hill of considerable elevation. From this point the shore takes a southerly direction for 2 miles, with a sweep inward, forming the W. side of port Maria.

Port Maria anchorage lies between the above shore and a small round islet, of moderate height, named Cabrita; but it is so confined, with foul ground extending nearly over the whole of the harbor, that there is only room for 10 or 12 vessels, moored head and stern, and they lie exposed to the northward.

Port Maria.

Running in for this anchorage keep the western pier on about a SSW. bearing, passing about 300 yards westward of Cabrita islet, to avoid a reef extending from it to the N. and NW. The bank of soundings is steep-to, and the first cast will be 9 or 10 fathoms. A good outside berth is in 7 fathoms, with the N. end of Cabrita in one with Pagee point bearing E. and Galina point N., or Barrack point NW. by N. Small vessels anchor nearer the eastern pier. Vessels in leaving should weigh early, to insure getting well out before the land-wind fails. Pilots are generally to be found some miles outside.

From Port Maria the coast trends about SE. by E. for 6 miles to Blowing point, and then SE. 5 miles to Annatto bay. The anchorage in this bay is close under the lee of Schoolmaster shoal, extending about $\frac{1}{4}$ of a mile from the eastern shore of the bay, and on which the sea breaks heavily. The bank of soundings is so extremely narrow and exposed that necessity alone should take a vessel to this anchorage.

Annatto bay.

If intending to anchor, however, have both anchors clear for running, and when off Free point, about a mile to windward of the town, run to the westward until Grays Inn house comes open to the westward of the wharf SW. by S., which mark will lead close round the W. end of the reef. Run in under easy sail, sufficient to moor with, and when Gibraltar wharf opens out to the eastward of a house above it, haul in towards the reef. When Grays Inn house is in one with the store-house, drop the port anchor under sail, veer out about 70 fathoms, and let go the best bower when the house comes open to the eastward of the store, taking

care not to shoot into less than 5 fathoms water. Moor with an equal length of chain each way, and lay the stream anchor out astern to the westward, on the edge of the bank. A vessel can leave this anchorage with either sea or land wind. Approaching from the eastward Free point makes as a long low bluff point, over which the masts of the vessels at anchor inside may be seen. Palmetto point, to the eastward, resembles Free point, and off it a breaking shoal extends $\frac{1}{2}$ a mile.

From Annatto bay the coast takes a general E. by S. direction for 15 miles to Ship head, a prominent bluff point with a small islet close to the westward of it, called Ship rock. There are a few small bays between, but quite exposed to the northward.

Port Antonio. Port Antonio lies 3 miles ESE. from Ship head and W. $\frac{3}{4}$ N. 6 miles from the NE. end of Jamaica, at the foot of the Blue mountains, which rise in lofty grandeur abruptly from the shore. The port is divided into two harbors by a narrow peninsula which takes a northerly direction nearly $\frac{1}{2}$ a mile from the main, with a curve to the NE. The town of Titchfield stands upon it, and at the N. end there is a fort and barracks, which are conspicuous objects from the offing. The point of the peninsula is foul to the distance of 100 yards, and the channel between it and the eastern shore is 400 yards wide.

The East harbor is about $\frac{1}{2}$ a mile in diameter, but the shallow bank bordering it runs off from the E. side nearly half-way across to the fort, and from 100 to nearly 300 yards from the S. shore it is quite open to the N., and the land-wind blows over a swamp. The West harbor is about half the size but equally deep, with bolder shores, and completely sheltered from the N. by Navy island and the reef extending westward from it. Navy island lies about 200 yards from the NW. side of Titchfield peninsula, and is nearly $\frac{1}{2}$ a mile long ENE. and WSW., nearly 400 yards broad, and moderately high. Its E. end is foul to the distance of about 200 yards, but its S. side is so bold that near the SW. end a vessel may careen alongside it.

Between the reef, which extends $\frac{1}{2}$ a mile from the W. end of Navy island, and the shoal ground bordering the main there is a very narrow passage called Hog channel, with 13

feet of water in it, but it is so crooked as to be only safe for droghers.

There is no danger in entering this harbor, and the eastern or weather point is bold-to. Stand in with the eastern ridge of the Blue mountains bearing SSW., or, if coming from the eastward, when Ship head is seen, steer for it on a W. $\frac{3}{4}$ N. bearing, and the church, fort, and the houses of the town will soon open out. The leading mark in is the church bearing S. by W. $\frac{1}{2}$ W.

Keep in mid-channel between Folly point and Navy island and then haul over toward the fort on the N. end of Titchfield peninsula to avoid the shoal ground on the E. side of the harbor, and approach the anchorage under easy sail, as there is no room to shoot far in. A good berth will be in 7 fathoms water, with Titchfield fort NW. or NW. by N. As a heavy swell sets into this port, sailing-vessels ought not to weigh for the purpose of proceeding to sea without being well satisfied that the land-breeze extends to a sufficient distance, for the depth of water at the entrance is so great as to render anchorage quite unsafe should the breeze fail.

To enter the West harbor run in under easy sail, and when within or abreast Folly point, edge away gradually until Careening point is well open, bearing W. by S. $\frac{1}{4}$ S., which leads in mid-channel. On opening the harbor haul up and anchor as most convenient in 6 or 7 fathoms. The holding-ground is excellent in both harbors. Vessels intending to make only a short stay had better choose the East harbor, as it is easier to sail out of.

Supplies of all sorts are plentiful, and good water may be obtained at a well about 40 yards from the shore.

The NE. end of Jamaica is a remarkable bold rounded headland rising almost perpendicularly from the sea to a considerable height. From thence the rocky shore trends about SE. by S. $11\frac{1}{2}$ miles to another prominent bluff point, with some remarkable red cliffs which bear NW. $\frac{1}{2}$ N. $5\frac{1}{2}$ miles from Morant point. The land is here also very elevated, sloping steeply down to the edge of the cliffs.

Manchioneal harbor, 4 miles NW. of the red cliffs, is a shallow inlet, about $\frac{1}{2}$ a mile long N. and S. and 2 cables in width; its entrance, S. of Nettle point, is 2 cables broad,

Manchioneal
harbor.

but within it is narrowed by the reefs to half a cable; there is anchorage under the northern reef in 5 fathoms, but it is exposed to the SE. Small vessels anchor further N. in 2 or 3 fathoms water.

To the southward of the red cliffs the shore bends in to the SW. and forms a deep bay, skirted by a reef, at the head of which is Plantain Garden river, $3\frac{1}{2}$ miles WNW. of Morant point. Between the reefs off the mouth of the river and

Holland bay.

the shore there is a roadstead, called Holland bay, where the telegraph-cables from Santiago de Cuba and from St. Thomas are landed.

Current.

The current around Jamaica generally runs to the westward, especially during the months of strong trades, when a dull sailer, bound to the NE., will frequently find it impossible to make way against it, and more advantageous to pursue the leeward route. It is, however, subject to interruptions, and, from many observations, it would appear that the westerly stream is not only checked, but sometimes turned with considerable strength to the eastward during the *increase* of the moon; and these statements are much strengthened by the fact that the Caymen fishermen generally select this period for making their voyages to Jamaica. Some observations tend to show that when the stream is running with unusual strength to leeward on the S. side of the island, it will be found weak, if not weatherly, on the opposite shore, and the contrary; and again, when setting strong to leeward on the N. shore of Jamaica, a weather-set will be found on the Cuba coast; but as yet sufficient data are wanting to confirm these latter statements.*

PEDRO BANK.

This bank is about 100 miles long E. and W., about 30 miles broad near the centre, and 45 miles at its western edge. Its eastern end appears to terminate in a point, but it has not been correctly defined. From Portland rock for about 50 miles along the SE. edge it is studded with dangers. The positions of this rock and the Pedro cays have been well determined, but the dangers between them have not been surveyed. These cays are dependencies of Jamaica.

* An Admiralty survey of the coast of Jamaica is in progress.

In rounding the E. end of the Pedro bank a good berth must be given to it, as the current generally sets strongly to the westward. In 1875 one of the Royal Mail steamships was lost here, while bound from Aspinwall to Kingston.

Portland rock appears to lie about 5 miles from the E. point of Pedro bank, and SSW. 40 miles from Portland point, on the S. side of Jamaica. It is a barren, rugged rock, 360 yards long N. and S., 100 yards broad, from 20 to 35 feet high, bold, and steep-to. At 5 miles to the eastward of it there is no bottom with 100 fathoms. Within less than a mile of the S. end the depths are 10 to 14 fathoms, and N. of it 10 to 16 fathoms, clear bottom. A vessel may anchor about half a mile from the W. side of the rock in 7 or 8 fathoms, but landing is very difficult.

Portland rock.

At $7\frac{3}{4}$ miles SW. $\frac{1}{4}$ S. from the rock lies a dangerous rocky shoal, on which the sea breaks heavily. It is said to be about 2 cables in length, and in two places the rocky heads just appear above water. There are 12 to 15 fathoms between it and Portland rock, and near the breakers $8\frac{1}{2}$ fathoms. At 4 miles SSW. from it there is reported to be $7\frac{1}{2}$ fathoms and irregular soundings. This edge of the Pedro bank should be avoided.

NE. cay, lying W. by S. 19 miles from Portland rock, is 3 cables long N. and S., 40 yards broad, and covered with bushes. On it is one remarkable large cocoa-nut tree, which is the first object seen in making the cays. From both ends a reef extends to the northward and southward to the distance of more than half a mile, and affords shelter to an anchorage and landing on the W. side. Nearly 6 miles E. $\frac{1}{4}$ N. from this cay lies a rocky ledge, and ESE. 7 miles there is another, and on both of them the sea breaks heavily.

N. E. cay.

Middle cay lies SW. $2\frac{3}{4}$ miles from NE. cay, and is smaller. It is also clothed with brushwood and its W. side is sandy. There appears to be a channel between them.

Middle cay.

SW. cay lies SSW. $\frac{1}{2}$ W. nearly 3 miles from Middle cay, and is the largest of the group, being nearly half a mile long in a NNW. and SSE. direction, about a quarter of a mile broad, and partially covered with low bushes of about the same height as those on NE. cay. A reef extends three-quarters of a mile from the N. and S. ends. On the W. side

S. W. cay.

there is a small sandy bay, where landing can be effected without much difficulty, and to leeward of it there is anchorage in 7 fathoms, but the ground is not good. There appears to be no passage either to the northward or to the southward of it.

South cay.

S. cay, lying S. by W. 3 miles from SW. cay, is composed of loose fragments of bleached coral heaped up to the height of about 10 feet, and at a distance it has the appearance of a small, barren, sandy cay. It is 260 yards long E. and W., and 90 yards broad. The E. end is foul to a short distance, but a reef extends nearly 2 miles from it to the westward. This cay is much frequented by seals.

The edge of soundings lies close to the eastward of the above islets, and the lead will give no warning of approach.

From S. cay the southern edge of the Pedro bank takes a WSW. direction for 30 miles, and for a distance of 22 miles from the cay it is studded with dangers, and in some places there are no soundings almost alongside them. The southwesternmost of these ledges is about $1\frac{1}{2}$ miles long, and one of the small rocky heads rises 4 or 5 feet out of the water, but it is not easily seen, and the breakers, in a strong breeze, are not made out until close aboard.

N. W. ridge.

From the extreme S. point of Pedro bank the edge trends NW. by W. for 15 miles, where there is a rocky ridge, about 12 miles in length SE. and NW., from 4 to 5 miles in breadth, with from 8 to 10 fathoms water on it. To the northward and westward of the ridge the depth on the bank is generally from 13 to 17 fathoms, sand and broken shells; there are 20 fathoms on the edge, which is very abrupt. To the northward of the cays and ledges the soundings are less and not so regular, varying from 7 to 13 fathoms. The cays should be approached very cautiously indeed from this quarter, and by no means in the night-time.

In some parts the edge of the bank may be discovered from a short distance by the discolored water; but this must not be trusted to on the S. side, where, in the vicinity of the shoals, the bottom is covered with dark weed.

The current near the Pedro bank generally sets strong to the westward, sometimes at the rate of more than 2 knots an hour.

Bajo Nuevo, or New Bore, about 95 miles SW. by S. of Portland rock, is oval-shaped, about 14 miles in extent ENE. and WSW., and 5 miles in breadth. Two extensive reefs rise from the bank; the eastern one close to its edge, is a solid semicircular reef, convex to the eastward, dry in places, with its horns curving along on the N. and S. sides of the bank for about $2\frac{1}{2}$ miles, and at the southern termination is a dry sand-bore. It is steep-to, the edge of soundings being about $\frac{1}{4}$ of a mile off, except at the northeastern end, where it is about 1 mile off.

The southwestern reef, somewhat similarly formed, is separated from the eastern reef by an opening about 1 mile wide, and it trends along the southeastern edge of the bank for $7\frac{1}{2}$ miles from the southwestern extremity of the eastern reef, and near its termination is a sand-bore. A shallow ledge, with 10 fathoms water close to it, runs off to the westward of the bore for about $1\frac{1}{2}$ miles to within 2 miles of the SW. end of the bank, which makes this termination of the reef, if possible, more dangerous than the other. Small ridges of sand occasionally form on other parts of the reef, but they disappear in strong breezes.

On the northern point of this leeward reef, which is nearly in the middle of the bank, there is a barren cay, composed of sand, broken coral, and drift-wood, thrown up by the sea to the height of 5 feet. It is 300 yards long, about 50 yards wide, and lies in latitude $15^{\circ} 53' 0''$ N., longitude $78^{\circ} 39' 4''$ W. On it there is a small pond which is resorted to by seals; and in the months of March and April the bank is visited by fishing-vessels from St. Andrew and Old Providence for the purpose of taking them.

To the westward of the eastern reef the N. side of the bank is clean for about a mile within its edge, as far as about 2 miles westward of the cay. There is also a clear space of about three miles on the western side of the bank. The depths vary from 8 to 17 fathoms of water over coral and sand. Care should be taken when standing toward the broken ground on the N. side of the leeward bank, as a coral head lies W. by S. $\frac{3}{4}$ S. 2 miles from the cay. The northern edge of the bank is also so steep that the first cast of the lead may be 12 or 15 fathoms. The bottom is

visible. The current in the vicinity of this reef sets strongly to the westward, at times as much as 2 miles an hour.

Anchorage may be taken up in moderate weather in 8 fathoms water, with the cay bearing E. by S., distant about $1\frac{1}{2}$ miles, but it is exposed to the winter breezes.

The Caymans. These three islands lying to the northwestward of Jamaica, and in the track of vessels sailing from that island to cape St. Antonio, in the island of Cuba, are between the meridians of $79^{\circ} 44'$ and $81^{\circ} 26'$ W., and the parallels of $19^{\circ} 14'$ and $19^{\circ} 46'$ N. The westernmost island is named the Grand Cayman, the second the Little Cayman, and the easternmost the Cayman Brac.

Grand Cayman island is 17 miles in length E. and W., 4 miles in breadth at the E. end, and 7 miles at the W. It is low and irregular and can only be seen from the deck of a moderate-sized vessel about 12 miles. Its SE. end forms a rounded bluff cliff, topped with trees to the height of about 40 feet above the sea. The SW. end is low and sandy, and at 400 yards southward of it is a small sandy cay, about 2 or 3 feet out of water, from which a reef which generally breaks on the greater part runs off $\frac{1}{2}$ a mile; it therefore requires great caution when rounding this end of the island, especially at night, as the lead will give but short warning. The NW. extreme is similar to the SE.; the NE. end is somewhat lower.

The island is almost everywhere thickly wooded, and on all sides but the W. is skirted by a reef, which is steep-to, the distance of from $\frac{1}{4}$ of a mile to 1 mile. At the E. end it forms a solid barrier to the distance of 1 mile, and the sea breaks on it heavily at all times. There are several small cuts through the reef on the S. side which admit the small vessels of the island into shelter within. The largest opening is on the N. shore near the NW. end, and it leads into North sound, which is shallow and of considerable extent. There is a church, and a small village is scattered along the shore of the bay at the SW. end of the island, but the principal settlement is at Bodden town, which stands about

midway on the southern shore. In 1868 the island contained about 3,000 persons.

The only anchorage for large vessels at the Grand Cayman is under the W. end, about $1\frac{1}{4}$ miles northward of the SW. point. Care, however, should be taken to pick out a clear sandy spot, which can be easily done by the eye, and shoot in under easy sail, for the soundings do not extend more than about 400 yards from the shore, and the edge is very steep. A clear berth will be found with the church E. $\frac{1}{2}$ S., and the SW. point S. $\frac{1}{2}$ W. in 7 or 8 fathoms, but if it is merely to communicate, a vessel had better remain under sail.

Anchorage.

As before stated, great care must be taken in rounding Southwest point to give it a berth of at least a mile, until it is brought to the eastward of N. In leaving the anchorage with the usual trade-wind, it will be better to heave the anchor up before making sail, to prevent dragging at a short stay, for the holding-ground is not good, and the anchor in tripping might catch under a shelf of rock and be lost or broken.

This anchorage is a convenient place for obtaining wood and stock, except cattle, which are not always to be had at the moment; turtle are generally abundant and form the chief product of the island. Strangers approaching are met off the south side, at a considerable distance, by canoes having them for sale. Water is obtained from wells at about 100 yards from the beach, but it is scarce.

Supplies.

Cayman bank, which lies about 10 miles westward of the Grand Cayman, is a remarkable ridge of coral and sand, taking a NE. by E. $\frac{1}{2}$ E. and SW. by W. $\frac{1}{2}$ W. direction, with a slight curve to the SE. It is 5 miles long, but scarcely $\frac{1}{2}$ a mile broad, with a depth of from 15 to 20 fathoms; on the edge the lead drops off suddenly into more than 100 fathoms water. From the NE. end the NW. point of the island bears E. by N. $\frac{1}{2}$ N. $6\frac{1}{2}$ miles, and the SW. point ESE. 8 miles, and from the SW. end the former bears ENE. $10\frac{1}{2}$ miles, and the latter E. $\frac{1}{2}$ S. $11\frac{1}{2}$ miles, and barely in sight from the deck of a moderate-sized vessel. By keeping a good lookout the discolored water may be seen, and sometimes it may be detected by a strong current-ripple.

Cayman bank.

Little Cayman. Little Cayman is 9 miles long in an ENE. and WSW. direction, about a mile broad, and from 45 to 55 feet high. The southern coast is sandy and skirted by a reef which extends for about $\frac{1}{2}$ a mile from the shore and is steep-to; both the E. and W. ends are foul to the same distance, and soundings will be found about 1 mile distant from them. There is a well in a small cove called Bloody bay, near the NW. end, and a house and flag-staff on the western part of the island. The village is on the S. side, about 2 miles from the W. end; here a passage through the reef is used by coasters.

Cayman Brac. Cayman Brac lies 4 miles to the eastward of Little Cayman. It is 10 miles long ENE. and WSW., and about 1 mile in breadth, woody, and partially cultivated by two or three families, whose chief occupation is catching turtle. Its E. end is a bold rocky cliff 100 feet high, from whence it decreases in elevation; the W. end is low and sandy. All its shores appear to be foul to a short distance, and the rocky ledge is steep-to; there is anchorage off the W. end in about 13 fathoms water, with a dark-green clump of trees bearing NE. Approach with care, as the bank shoals suddenly, and pick out a clear spot for anchoring. The village is on the NW. side of the island.

Pickle bank. Pickle bank, discovered in 1840 by H. M. Schooner *Pickle*, lies in latitude $20^{\circ} 23' 20''$ N., longitude $80^{\circ} 29' 50''$ W.*

It is of an irregular shape, nearly $2\frac{3}{4}$ miles long in a NE. by E. and SW. by W. direction, and a little less than 1 mile wide. The soundings are from 10 to 30 fathoms.

The outer edge of the shoal is clearly marked when immediately over it, and is plainly visible from a boat running along it. On the edge there are from 13 to 20 fathoms of water, and one boat's length outside of the bank there is no bottom at 35 fathoms.

When directly over the bank the white coral with the dark spots of grass can be plainly seen, but 20 yards away the water has the appearance of the rest of the sea.

* Commander H. L. Howison, U. S. N.

CHAPTER VII.

SANTO DOMINGO, OR HAYTI.

Variation in 1876 :

Alta Vela, $2^{\circ} 20'$ E. | Cape Engaño, $1^{\circ} 10'$ E.

Cape Isabella, $1^{\circ} 30'$ E. | Cape Tiburon, $3^{\circ} 0'$ E.

Annual decrease about $2'$.

Santo Domingo, or Hayti, is a rich and beautiful island, the second in size of the West India islands. It is about 350 miles long from cape Engaño on the E. to cape Tiburon on the W., and its greatest breadth is about 150 miles from cape Beata on the S. to cape Isabella on the N.

The island is very irregular in form, being deeply indented with bays and inlets and having corresponding projections, the most remarkable of which forms the southwestern extremity and is 150 miles long and from 18 to 40 miles wide.

Three connected chains of mountains intersect the island from W. to E., and between these ranges are extensive plains and savannas.

The principal range of mountains called the Cibao runs in an E. and W. direction from cape Nicolas to cape Engaño. Its highest peak is mount Yaque, near the centre of the island, and rises to the height of 7,560 feet. Almost parallel with this chain another, commencing near Monte Christi, runs in an easterly direction, skirting the N. coast, and terminating abruptly on approaching the peninsula of Samaná. To the eastward of this range are low marshy grounds, interlaced by estuaries and channels which formerly separated Samaná from the main-land and afforded communication from the gulf of that name to the sea on the N. shore of the island; the heights, however, re-appear on the opposite side of the low ground and terminate in cape Samaná.

Mount Yaque.

Between these two mountain-ranges extends La Vega Real, affording rich and extensive pasture-lands.

The third and most southerly mountain-range commences at cape Tiburon, and extends to the eastward, terminating

at the river Neiva, about 80 miles west of the city of Santo Domingo.

All the streams of Hayti, of any importance, originate in the great central mountain-chain. The principal rivers are the Artibonite, flowing W.; the Monte Christi, or North Yacki, NW.; the Yuma, flowing SE.; and the Neiva, or South Yacki, the Nisao, and the Ozama, flowing S. The mouths of all these rivers are obstructed by sand-bars, and hence few of them are navigable. The Ozama, however, admits vessels drawing 13 feet.

Mineral springs of various kinds exist in different parts of the island.

The mineral products are various and very rich, including gold, platinum, silver, quicksilver, copper, iron, tin, sulphur, manganese, antimony, and rock-salt.

All tropical fruits and vegetables grow in abundance, and coffee, sugar, cotton, indigo, and tobacco can be plentifully raised.

Timber of all kinds is abundant, including pine, mahogany, oak, satin-wood, *lignum-vitæ*, and many other species.

The sea-ports are all or nearly all very unhealthy, yellow fever being a constant attendant during the hot season.

The island was discovered by Columbus on the 5th of December, 1492. It is now divided into two nominal republics. The eastern one is called Santo Domingo, and the western one Hayti. The boundary-line is very irregular and is in dispute, but is generally considered to run from the mouth of the river Massacre, in Manzanilla bay on the N., to the creek Anse-a-Pitres, or Pedernales, on the S. coast, in about longitude $71^{\circ} 50'$ W.

The people are almost entirely of the negro race, and speak a Spanish dialect in Santo Domingo and a barbarous French patois in Hayti.

Winds.

The winds in the island of San Domingo, or Hayti, vary according to the trend of the different parts of the coast.

The rainy season continues from the end of May until November. In this season gusts and storms are frequent; at the same period strong SE. winds are experienced in the bay of Gonaïves and in the channel of St. Marc. In November, December, January, and February the winds from

NE., variable to NW., blow with force, principally on the northern coast of the island.

On the southern coast frequent storms occur in June, July, and August, in which the winds come from the S. and are violent principally from that direction.

On the entire coast of this island the sea-breezes blow, their direction varying according to the trending of the land. The sea-breeze commences from 8 to 9 a. m., increases until midday or 4 p. m., when it diminishes and gives place to the land-breeze, which lasts until 4 or 6 o'clock in the morning.

The general track of hurricanes lies to the northward of this island, occasionally, however, during the hurricane season, from July to October, they blow with terrific force.

In describing the coasts of the island of San Domingo, we shall commence at cape Samaná and follow the E., S., and W. coasts to cape Nicola Mole, then returning to cape Samaná, follow the N. coast from windward to leeward.

Cape Samaná is the eastern point of the peninsula of the same name and forms a bold double cliff of moderate elevation, the upper one rising a short distance within the summit of the lower. These cliffs extend about 2 miles to the southward of the cape, are of a reddish color, and steep-to. Their southern point is 833 feet high, and from here the bold rocky shore takes a SW. direction for $6\frac{1}{2}$ miles, to Balandras head. This prominent headland is a remarkable red cliff lying at the foot of mount Diablo, which, $1\frac{1}{2}$ miles inland, rises to a peak 1,300 feet high.

Cape Samaná.

Balandras head.

At about half a mile to the NE. of Balandras head, at the S. end of a small sandy bay, there is a remarkable cliff, with three large fissures, and between it and the head, at 200 yards from the shore, lies a small rocky islet called Grapin cay. A small reef breaks at a short distance off the extremity of cape Samaná, but the shore just described is clear and steep-to, until abreast of Balandras head, when the depth decreases suddenly to $6\frac{1}{2}$ fathoms a mile off, and the soundings becomes irregular.

Grapin cay.

The Canandaigua bank, discovered in 1872, by the U. S. corvette of that name, is an extensive coral shoal $3\frac{1}{4}$ miles long NW. and SE., and nearly 1 mile wide. The least wa-

Canandaigua bank.

ter on the bank is $5\frac{3}{4}$ fathoms. Its NW. end bears about E., distant 4 miles from Balandra head.

From Balandras head the coast turns sharply to the westward. One and a half miles from the head in this direction is Cocoa point, on which are the ruins of an old five-gun battery. Off this point foul ground extends about 200 yards. To the westward of the point is a small cove, called Cocoa bay. One and a half miles to the W. of Cocoa point, Bonhome point. is Vinas or Bonhome point, near which, to the eastward are several rocks and two small cays, the larger of which is called Bonhome cay.

Immediately to the westward of Bonhome point is the cove called Carenero Chiquito, about 1 mile across from point to point, and having in its centre the Chiquito reefs, extending out nearly $\frac{3}{4}$ of a mile from the shore, but steep-to, and easily seen. Off the western point of the cove is Carenero Chiquito cay, from which a ledge extends off nearly $\frac{1}{2}$ a mile to the southward.

Anchorage. Anchorage may be found either between Bonhome point and the reef or to the westward of the reef. The more commodious anchorage will be found E. of the reef, to take which it is only necessary to haul close round Bonhome point, which is clear and steep-to, and anchor close in shore with it bearing SE. by E. $\frac{1}{2}$ E., in 6 fathoms of water.

The anchorage to leeward of the reef lies between it and the ledge which makes out from the cay. It is very narrow, and the eye will be the best guide in approaching it.

West of Carenero Chiquito, and separated from it by Lirio point, is Clara bay, perfectly clear and affording good anchorage. The bay is $\frac{1}{2}$ a mile wide between Lirio and Gorda points, both of which may be approached within 200 yards.

The shore of Clara bay was the scene of the first conflict between the followers of Columbus and the Indians, and here the blood of white men was shed for the first time in the New World.

A good berth will be found, with from 9 to 11 fathoms of water, in the middle of the bay and just within a line drawn between the two points.

About 1 mile S. of Bonhome point, and 3 miles W. from Balandras head, are the Banistre or Levantados cays, lying

on the S. side of the only ship-channel into the gulf of Samaná.

Banistre cay is the largest of the group. It is 150 feet high, about $\frac{1}{2}$ a mile long E. and W., $\frac{1}{4}$ of a mile broad, and is thickly wooded. About 200 yards west of it is a low rock called Chinchilline cay. To the northward of Banistre cay, about 400 yards distant, is Pascal cay, a small, round islet, steep-to on its northern side. These three cays are joined together by a reef on which there are from 3 to 7 feet of water.

Jean Bart reef is a small ledge about $\frac{1}{4}$ of a mile NW. from Pascal cay, and having a depth of 22 feet upon it. Between this reef and the north shore the channel is $\frac{1}{2}$ a mile wide, and of irregular depth, varying from 6 to 12 fathoms. Jean Bart reef.

The most southerly of the Levantados group is called Arenas, or Sandy cay. From Gorda point, on which there are the ruins of an old battery, the shore trends to the NW. for about $1\frac{1}{2}$ miles, and then turning to the southward as far as Escondido point, forms a bight called Samaná bay, sheltered to the southward by a chain of reefs and cays extending about 1 mile ESE. from Escondido point. The harbor is also called port Santa Barbara, from the town or collection of huts which stands at the head of the bay, at the base and on the sides of some small hills, which are almost hidden from the eastward by a headland on which is a flag-staff and the ruins of an old fort. On the ridge back of it there is another small fort in ruins. Samaná bay
Santa Barbara
de Samaná.

The entrance to the harbor lies between Gorda point on the E. and Paloma, or Trapezon, cay on the W. This cay is the most easterly of the chain mentioned as extending from Point Escondido. Paloma cay.

From the E. end of Paloma cay a shallow ledge runs off 500 yards in a southeasterly direction. Its extreme end with a depth of 25 feet lies SW. by S. $\frac{1}{4}$ S. $\frac{1}{3}$ of a mile from Gorda Point, leaving the entrance to the channel between it and the point less than $\frac{1}{4}$ of a mile wide.

North of the western extremity of Paloma cay and nearly in mid-channel there is a bank with 4 fathoms of water on it, with a narrow channel on either side.

Carenero
Grande cay.

Carenero Grande cay, the next one to the westward, is nearly $\frac{1}{4}$ of a mile long, and has a hill on each end. For several years the United States Government had a coal-station here, where vessels drawing not more than 17 feet could lie alongside the wharf. Between this cay and Escondido cay, close to the point of the same name, the ground is foul, with only a boat-passage.

Aguada bay.

Off the N. side of Carenero Grande cay a narrow ledge extends off nearly 300 yards and is steep-to. On the N. shore of Samaná bay, directly N. of Carenero Grande cay, there is a small cove, called Aguada bay, in which anchorage may be found.

Gomère bank.

The western limit of Aguada bay is called Gomère point. Immediately S. of it, at about 150 yards' distance, is a rocky shoal, nearly awash, called the Gomère bank, with deep water on either side, and between it and the head of the bay is the inner anchorage, sheltered from all winds and having a depth of from $3\frac{1}{2}$ to 5 fathoms.

Lying SSE. from the small fort at the eastern end of the town and about 200 yards distant, is a small bank with from 8 to 10 feet of water on it.

Directions for
entering Samaná
bay.

Being at a distance of 3 or 4 miles E. of Balandras head, there will be no difficulty in recognizing it by its red color and the detached rock lying at its base. This headland should be rounded at a distance of from $\frac{1}{4}$ to $\frac{1}{2}$ a mile, and a course steered along shore to the westward, taking care not to shut Balandras head in with Cocoa point until past the Carenero Chiquito reefs. The buoys and beacons formerly marking the limits of this reef and the Levantados reef have all disappeared. As soon as the Carenero Chico cay bears NE. by N., the reef of that name will have been passed and the vessel may be hauled up toward Gorda point, taking care in passing to the westward of it to keep the eastern hill of Carenero Grande cay open to the northward of Paloma cay, in order to avoid the ledge to the eastward of the latter.

The shoals may often be seen from aloft.

Having passed Gorda point, the deepest water will be found on the S. side of the channel, along by the edge of the reef, until abreast of the W. end of Paloma, when haul in NW. $\frac{1}{2}$ N. toward Aguada bay to avoid the shoal off Great Carenero cay. When the W. end of that cay bears SW. $\frac{3}{4}$

W., bear away to the westward for the inner anchorage. Keep the southern side again aboard to clear the Gomère bank, southward of the W. point of Aguada bay, and anchor in 5 fathoms water, muddy bottom, with Santa Barbara fort bearing NNE. $\frac{3}{4}$ E., W. end of Great Carenero cay NW. $\frac{1}{4}$ N., and W. end of Escondido cay SE. by S. $\frac{1}{4}$ S.

As the land and sea breezes are quite regular here, except for short periods in the winter when strong NE. trades prevail, a sailing-vessel should only attempt to leave port Santa Barbara with the land-wind.

Should the sea-breeze spring up before the vessel reaches Balandras head great care must be taken, if to the eastward of the Levantados cays, not to bring them to the northward of W. until abreast Balandras head, in order to avoid the Banistre reef, which stretches to the SE. across the mouth of the gulf of Samaná, and on which many vessels have been wrecked. It is high water, full and change, at Samaná at 9^h 30^m, and the rise and fall is about 3 feet. The tides frequently run at the rate of $1\frac{1}{2}$ miles an hour, and during the rainy season a velocity of 3 miles is sometimes attained. In leaving the harbor with a sailing-vessel, attention must therefore be paid to the time of the tide.

Banistre reef.

Tides.

The gulf of Samaná is a deep estuary, about 30 miles in length, and with an average width of 10 miles.

Gulf of Sa-
maná.

The mouth of the gulf lies between cape Samaná on the N. and cape Rafael on the S., and is nearly closed by the Banistre or Levantados reef, which extends from the cays of the same name in a southeasterly direction, joining the southern shore of the gulf at a point about 11 miles W. of cape Rafael. The western side of this reef runs nearly S. from the Levantados cays to Capitan point, on the southern shore of the gulf, entirely screening and obstructing about 18 miles of the southern coast. The shores of the gulf have never been thoroughly explored, but a secure anchorage for a great number of vessels might be found under the shelter of the reef. There are a few small ports in the gulf visited by coasters to load mahogany. The village of Savanna-la-mar, on the S. side of the gulf, is a scanty collection of huts. Landing, even from a small boat, is difficult, on account of the mud-flats which reach off from the shore.

Savanna-la-
Mar.

Bay of San
Lorenzo.

The bay of San Lorenzo, or Peros, is a small bight on the southern shore of the gulf, sometimes visited by coasters.

The Yuna river, which empties into the western part of Samaná gulf, is obstructed at its mouth by a sand-bar, with only 4 feet of water on it. Boats may ascend it to within

Town of Cotuy. a few miles of Cotuy, 40 miles in the interior.

The channel into the gulf of Samaná is to the westward of the Levantados or Banistre cays, and, to enter the gulf, the directions given for entering the bay of Samaná must be followed till after passing the Levantados, then haul to the southward round Arenas cay, passing at least 1 mile to the westward of it, to avoid the surrounding sand-banks and shoals.

Port Jicaco or
English port.

Port Jicaco, or English Port, lies on the S. shore of Samaná gulf and 11 miles W. of cape Rafael.

The harbor lies between Jicaco point on the E. and Manati point on the W. The rivers Yeguada, Guanabo, Real, and Jayan empty into the harbor, which is principally resorted to by coasters to load logwood and mahogany.

There is a small rocky islet, called Jicaco, near the entrance, for which it is an excellent landmark, as well as for the leeward and windward channels into the port. To enter the harbor bring this islet between the peaks of a high mountain inland, and steer in on this bearing, (S. by W.) Good anchorage will be found in $5\frac{1}{2}$ or 6 fathoms of water inside the reef, about $\frac{1}{2}$ a mile from shore. A stranger should not attempt to enter port Jicaco without a pilot, nor indeed should he run inshore to leeward of cape Rafael without one.

Port Colorado.

From point Jicaco the reefs which close the mouth of Samaná gulf run to the northward as far as Banistre cays and to the westward as far as port Colorado. No directions can be given for this port. The river Capitan empties into it, and the coast between it and port Jicaco is obstructed everywhere with reefs, on which are several cays and islets. Two rivers, called the Culebras and the Magua, empty into the gulf between Jicaco and Colorado.

Cape Rafael.

Cape Rafael, the southern point of the great gulf of Samaná, is quite low; but 2 miles inland from it there is a remarkable conical hill, called mount Redondo, which, at a distance from NW. and SE., has the appearance of an island. The

coast in the vicinity of cape Rafael is low and foul and should not be approached nearer than 3 miles.

From cape Rafael to cape Engaño the coast runs in nearly a straight line SE. for 40 miles. This part of the island abounds in mahogany and logwood, and there are several small ports and bays where small vessels load with these woods, but as the shore is skirted by a broken reef and exposed to the wind and sea these small anchorages are not only difficult to approach, but are dangerous even in the fine season.

There are several small cuts in the reef through which vessels of 6-foot draught may pass, but larger vessels must lie 1 mile or more off shore.

Frequent accidents occur, and communication with the shore is sometimes interrupted for weeks at a time.

There is no opening in the reef or safe anchorage between cape Rafael and port Macao, 25 miles to the SE.

Port Macao is a small bay about 1 mile deep and 2 miles wide. To the northward it is protected by a reef which joins two remarkable rocky islets. The eastern or windward one, called Cabezote Barlovento, lies close off Macao point, with a boat-channel between them; the other, Cabezote Sotavento, or el Infiernito, lies about $\frac{1}{2}$ a mile from the shore and to the eastward of the entrance of the river Anamuya, where there is said to be an excellent oyster-bed. The anchorage for coasters is about $\frac{1}{2}$ a mile to the northward of the reef, and their cargoes are brought off by boats from the Anamuya river.

Port Macao.

Mahogany and logwood are also loaded here from the rivers Maymon and Nisibon, the first 5 miles and the second 14 miles NW. of port Macao.

The anchorage of Arena Gorda is the first one to the SE. of port Macao. There are three small cuts in the reef here through which a small vessel not drawing more than 5 feet may pass to the inner anchorage. Larger vessels lie from 1 to $1\frac{1}{2}$ miles off shore in 10 to 12 fathoms of water.

Arena Gorda.

Los Ranchitos, 2 miles E. of Arena Gorda, has two small cuts in the reef, with 4 or 5 feet of water in them. The anchorage is 2 miles off shore in a depth of from 11 to 12 fathoms.

Los Ranchitos.

Babaro.

Babaro, 9 miles E. of Los Ranchitos, is one of the best of these anchorages, as the reef lies near the shore and the sea is smoother. The anchorage for large vessels is $1\frac{1}{2}$ miles off shore in 10 or 12 fathoms of water.

Cabeza de
Toro.

Cabeza de Toro is the first anchorage to the westward of cape Engaño.

Through the reef in front of this port there are two passages, and in the lee one, called la Nayba, a depth of 10 or 12 feet may be carried. Large vessels anchor, in 10 or 12 fathoms of water, outside, with a bottom of sand and rock. This place is much frequented by wood-droghers, and large quantities of mahogany are shipped.

Cape Engaño, the eastern extreme of the island of Santo Domingo, is a long low point from which a ridge of rocks runs 3 miles in a northeasterly direction.

A short distance inland there are two small hills which, seen from a W. by S. direction, at a distance of 17 or 18 miles, present the shape of a wedge.

Between cape Engaño and point Espada the coast is low and soundings extend some distance off shore, with a white sandy bottom.

There are several small cuts through the reef which skirts this part of the shore and some small sandy bays, where mahogany is shipped, but, like similar places between capes Rafael and Engaño, large vessels are obliged to anchor 2 miles off shore, exposed to wind and sea.

Point Espeda.

Point Espada,* the SE. extreme of the island, is a remarkable bold cliff of moderate height. Its extreme point is low and prolonged by a bank or reef which gives the water a whitish color. Banks of this nature are frequently met with in different places off the coast of Santo Domingo and are called Placeres blancas, or white grounds. They are very often strewn with sharp-pointed rocks.

Tides.

At the anchorages outside of the reefs on the southeastern coast of Santo Domingo the flood-tides generally run to the SSW. for 9 hours, with a strength of $3\frac{1}{2}$ miles an hour, and the ebb-tide, for $2\frac{1}{2}$ or 3 hours, runs NE. by N. The tides in this vicinity are, however, very variable in their strength, duration, and direction; sometimes ebb and flood each last

* The native pilots call cape Engaño of the present charts Punta Espada, and the latter cape Rafael.

six hours. Sometimes again the ebb lasts longer than the flood, and in this case the NE. current is stronger than that running to the SE.

From Espada point the coast trends WNW. for 6 miles and then turns sharply to the southward for 3 miles to cape Falso. At the bottom of the bight thus formed is the mouth of the river Yuma or Higüey.

River Yuma or
Higüey.

This river is obstructed by a bar with 8 or 9 feet of water on it, but inside there is a depth of 12 feet.

On the bank of this river, 13 miles inland, is a town of the same name.

Vessels about to visit any of the numerous small places on the E. coast or between point Espada and the city of Santo Domingo generally take a pilot at the latter place, which is the port of entry for all these places.

Saona island may be justly said to form the southeastern extreme of the island of Santo Domingo, for the space between them is so filled with reefs and shoals as to leave only a boat-passage.

Saona island.

This island is about 16 miles long from WNW. to ESE., and its greatest width is about 5 miles.

The island is covered with trees. Its NE. point is formed of steep bluffs. Its southeast point is quite low, and a dangerous ledge extends a distance of 3 miles in the same direction. The sea breaks on this ledge $1\frac{1}{2}$ miles off shore; farther out the depths are 4 and 5 fathoms.

At a distance of 5 miles off the southern shore of Saona there are from 7 to 10 fathoms of water, and a ship should keep at least this distance when to the southward and eastward of the island. Three miles to the westward of the SE. point of Saona there is in Bahia Caballo good anchorage, off a sandy beach.

Bahia Caballo.

In approaching this anchorage great care must be taken to avoid a dangerous rocky head called the Alert rock, lying 2 miles to the southward of the bay, where the sandy beach ends and the shore becomes rocky. This rock has only 6 feet of water on it, and the sea breaks in heavy weather. NW. $\frac{1}{4}$ of a mile of the Alert rock there is another rocky head, with from 9 to 18 feet of water on it, with a deep channel between the two dangers.

Alert rock.

Kurea reef.

A reef, on which the brig *Kurea* was lost May 6, 1867, is said to lie 5 miles S. of Bahia Caballo. It is described by the master of the *Kurea* as from 1,000 to 2,000 yards long, 200 yards wide, and nearly awash at low water. This may be a continuation of the Alert rock mentioned above. Until more accurately defined, navigators should give the island a good berth.

Both wood and water can be obtained at Bahia Caballo.

The western coast of Saona island is lined with reefs and dangers, especially toward the northwestern point and near Palmillas point on the main-land.

Catalinita island.

The little island of Catalinita lies $5\frac{1}{2}$ miles NW. of the NE. point of Saona. Between the two a dangerous reef extends, called the Horseshoe. Near Saona there is a cut in this reef through which a depth of 6 fathoms may be carried into a sheltered anchorage, with muddy bottom, having Catalinita island bearing N. by E. The N. shore of Saona is steep to till this reef is approached, but the sea is so heavy and the currents so strong and irregular that this part of the island had better be avoided. Indeed, Saona island should not be approached from any direction nearer than 6 miles, except in cases of necessity.

From Palmillas point, 3 miles from the NW. point of Saona island, the coast of Santo Domingo runs about 8 miles towards the NNE., and then trends to the eastward for about 60 miles, as far as the river Ozama, on the right bank of which is the city of Santo Domingo.

To the eastward of the Ozama the plains extend for 15 or 20 miles inland. The shore, in this part of the coast, is composed of rock, with hardly a sand-beach to be seen, and the sea generally breaks violently on it.

Bayahibe.

A few miles to the northwestward of Palmillas point is the anchorage of Bayahibe. Here a vessel may anchor in 6 or 7 fathoms of water about 1 mile off shore, well sheltered from the SE. by Saona island and Palmillas point.

River Quiabon.

The mouth of the river Quiabon is about $2\frac{1}{2}$ miles WNW. of Bayahibe anchorage. It is obstructed by a bar, sometimes dry and rarely having more than 3 feet of water on it. The anchorage off the mouth of this river is only an open roadstead, but with good holding-ground. The best berth will be found with the two points to the westward, Minos

and Aguila in one, the latter being the eastern point of entrance to the Romana, and with two cocoa-nut trees on shore in front of the largest house in the village bearing N.

The ground to the eastward of this bearing is rocky, and there is said also to be in that direction a rocky shoal with only 13 feet of water on it. In the rainy season good water can be obtained by going 2 miles up the river.

Shoal.

Between the mouth of the Quiabon and the Romana river, a short distance to the westward, there are three small loading-places, called Minos, Burgado, and Caletón. The first two are only fit for small vessels, and the latter is entirely unsheltered. The anchorage for large vessels off Minos has 19 fathoms of water.

The mouth of the river Romana lies a short distance W. of the river Quiabon, and 2 miles E. of Santa Catalina island, which lies 2 miles off shore. The entrance may be known by the village on the hills on the right bank, 180 feet above the sea. The river empties into the sea between bold limestone bluffs, and its entrance is only about 200 yards wide. Large vessels, however, can enter it, and it is one of the best and most sheltered anchorages on the southern coast of Santo Domingo.

River Romana.

The only danger to be avoided is a small rock, with 6 feet of water on it, lying about 75 yards SE. of the western point. A short distance E. of Aguila point, the eastern point of the entrance, is a reef which breaks and is easily seen.

The entrance to the river Romana is too narrow to beat in. On standing in toward the entrance two prominent points will be seen, one on each side of the river. The western point is about $\frac{1}{2}$ a mile, and the eastern one $\frac{2}{3}$ of a mile, inside the entrance. When in line they lead directly on the rock just spoken of. They should therefore be kept just open of each other, bearing about N. by W. $\frac{1}{2}$ W. Steer in on this line, and when inside the mouth of the river keep the western shore aboard. Upon entering the river, two small rocks, 6 or 7 feet out of the water, will be seen on the eastern shore, a short distance S. of the inner salient points just mentioned. With the northern of these rocks in one with Aguila point, a vessel may anchor in 5 fathoms of water. The ship should be steadied by a hawser to the rocks. Small vessels of 10

Water.

or 11 feet draught may, with the assistance of a pilot, go 2 miles farther up the river, or they may anchor just within the inner western point. Off the eastern inner point there is a bank with only 6 feet of water on it. Good water may be conveniently obtained by sending a boat up the river as far as the rapids.

Santa Catalina
island.

River and an-
chorage of Cumayazo.

The island of Santa Catalina is small and low, and lies 2 miles off the coast of Santo Domingo, between the mouths of the rivers Romana and Cumayazo. The channel between it and Santo Domingo is navigable for large vessels. The Santo Domingo shore should, however, be kept aboard to avoid a reef which generally breaks off the NW. point of Santa Catalina.

Nearly abreast of the western end of Santa Catalina island is the entrance to the river Cumayazo, said to be broad and deep enough to afford shelter to large vessels. Those drawing 18 feet or more should anchor about 300 yards inside the entrance, in 4 fathoms of water, and a little to the southward of the smaller of two coves on the eastern bank. This berth is near a small dry rock.

Small vessels of 6 or 8 feet draught may take the channel close to the western bank and ascend the river as high as San Pedro rock, $1\frac{3}{4}$ miles from the mouth. Beyond this rock there are three islands. Higher up, the river becomes so narrow that it is only navigable for boats to the embarcadero of San Juan, 2 miles above San Pedro.

Water.

A short distance above San Juan good water may be obtained from a basin called Agua Dulce. Boats cannot approach it nearer than 200 yards.

River Soco.

To the westward of the Cumayazo $5\frac{1}{2}$ miles is the mouth of the river Soco. Although one of the largest of the rivers flowing S. from the Cibao mountains, it is not navigable except for boats, as a shallow bar obstructs its mouth, inside of which the channel is blocked up by sand-banks, covered with drift-wood. Vessels sometimes anchor about 3 miles off shore in 5 fathoms of water, with the entrance bearing N. by E. or NNE., but this anchorage is entirely unprotected. Small vessels lie closer in, in 3 or 4 fathoms, exposed to southerly winds and hardly sheltered to the eastward by Mortero point.

The landing place is 200 yards inside the mouth of the river, on the eastern bank.

The town of Santa Cruz del Ceibo lies on the bank of the river of the same name, which is one of the branches of the Soco, about 15 miles from the sea. Santa Cruz
del Ceibo.

The port of Macoris lies 6 miles W. of the river Soco, and is formed by the river of the same name. It will admit vessels drawing 10 feet of water. The entrance is about $\frac{1}{2}$ a mile wide between the S. point and point Tibiz, N. and W. of it. Nearly abreast of the entrance there is a small cay, called Isleta, having a reef extending off its northeast point. Port Macoris.
On the western side of this cay there is a mud-flat, and the channel, with from 15 to 17 feet of water, runs close along the eastern shore. Care must be taken to avoid a small rocky head called Edward shoal, with 6 feet of water on it, which lies about 100 yards off the S. point, and between it and the N. point. Cay Isleta.
Edward shoal.

The mark to clear Edward shoal is the second cocoa-nut tree, near the house of the captain of the port, in the village on the eastern bank, in one with the N. point. After passing the Isleta reef, the cocoa-nut trees should be kept just open till the vessel is within the Edward shoal, when haul in and anchor in 11 feet of water, just inside the N. point. A sailing-vessel can only leave the river with a fresh land-breeze, and as the current sets toward the Edward shoal, care must be taken to avoid it.

Nine miles W. of the Macoris river is the open roadstead of Guayacanes, 18 miles E. of the mouth of the Ozama river. The anchorage is 1 or $1\frac{1}{2}$ miles off shore, in 8 or 9 fathoms, with good holding-ground. There is a small opening in the reef skirting the shore through which boats may reach the landing place. Anchorage of
Guayacanes.

Andres bay is formed between Cansado and Magdelana points. The outer part of this bay is not safe, but off Agua del Rey, in the inner or eastern part, about 4 miles from Magdelana point, there is fair anchorage off the beach in 5 fathoms water, but a heavy swell rolls in. A vessel will lie sheltered as far round as SE., but it is open to the southward. There is another spot in the bay, called Playa de Andres, where wood is shipped; but the anchorage is 3 miles from the shore, outside an extensive reef, which forms Andres bay.

with the coast a channel with 9 feet water. This place is famed for the prodigious number of pigeons which visit it in May and October, when they may be killed with sticks.

La Caleta.

La Caleta is a small bay close to the westward of Cansado point, where temporary anchorage will be found in from 3 to 7 fathoms water, sheltered round to SE. Near the point there is an embarking place for mahogany, but large vessels are obliged to load under sail.

The gulf of Santo Domingo lies between point Cansado on the E. and point Nisao on the SW., is about 25 miles wide, and 10 miles deep.

Santo Domingo city.

Santo Domingo city lies on the right bank of the Ozama river, which empties into the sea 15 miles WNW. from Cansado point. The bar at the mouth of the river prevents vessels of a greater draught than 10 feet from entering, there being generally 11 feet on the bar at low water and 20 feet inside; all others are obliged to anchor in the open roadstead. The city is surrounded by a wall, which, with the fort at the entrance of the river, the outworks, bastions, and many of the principal buildings in the town, is in a more or less ruinous state. The town is now the capital of the Dominican republic. It was founded in 1496 by Bartholomew, the brother of Columbus, on the E. bank of the Ozama, and here it was that Columbus was imprisoned. It was destroyed by a hurricane in 1502 and was rebuilt on its present site. In 1586 Sir Francis Drake took it by assault, pillaged, and nearly destroyed it. In 1634 and 1691 earthquakes ruined most of the fine buildings which had been spared by Drake. During the occupation of the city by the Haytians from 1822 to 1824 very many of the remaining monuments of its former prosperity were destroyed.

The roadstead of Santo Domingo can only be considered as a temporary and unsafe anchorage.

Estudios bank.

The bank of Estudios extends about 1 mile off shore, with from 5 to 25 fathoms of water. It is composed of rock with a thin covering of sand and mud, not at all trustworthy holding-ground. A vessel lying here in the season of rollers or tidal waves (November to March) or in the hurricane season (July to October) would be very likely to drag her anchors, and in such a case on this rocky shore, where the sea beats with such fury, there would be little chance of saving

Anchorage.

either ship or crew. With any appearance of bad weather ships lying in this roadstead should immediately seek an offing.

In approaching this anchorage the lead should be kept going, as the bank is steep-to. Comparatively good holding-ground will be found in 8 fathoms of water, bottom of mud and sand, on the following bearings: Torrecilla point, NE. $\frac{1}{2}$ E.; signal-tower, N. $\frac{1}{4}$ W. With these bearings some houses on the eastern side of the Ozama will be open of the citadel. With these shut in, the bottom is rocky.

Anchorage.

The difference in the nature of the coast is a good indication of a vessel's position in this neighborhood.

To the eastward of the Ozama the plains extend 15 to 20 miles inland, but to the westward, 4 or 5 miles from the shore, are the first steepes of the southern rise of the Cibao chain, which run nearly through the middle of the eastern part of Santo Domingo, lower gradually, and terminate near cape Engaño. The peak of Yaque, the highest part of the chain, rises NW. by W. $\frac{1}{4}$ W. from the city of Santo Domingo, distant about 66 miles.

Aspect of the coast.

The shore to the eastward of Torrecilla point is almost entirely composed of rock; there is scarcely a sandy beach to be seen, and the sea generally breaks against it with great violence.

Half-way between the southwestern and southeastern points of the city is the bastion of San José, where from a round white tower a *fixed white* light is shown, 113 feet above the sea-level, and visible at a distance of 9 miles.

Light.

Immediately below the citadel is a point called Torrillo or Homenaje point, where the western bank of the Ozama trends toward the N. The entrance to the Ozama river between Torrillo point and Torrecilla point, which is SE. by S. from it, is about $\frac{1}{2}$ a mile wide. The latter point, which is the eastern boundary of the entrance, is low, sandy, and skirted by a bank which extends 100 yards toward the SW. On this bank there is from $1\frac{1}{2}$ to $2\frac{1}{2}$ fathoms of water, and the sea breaks heavily on it with a southerly swell. From Torrecilla point the edge of the bank runs nearly N., with $1\frac{1}{2}$ fathoms of water on it, as far as Arenas point, which is low and salient, lying above the SE. angle of the fort, and contracting the river to a width of about 100 yards.

Torrillo or Homenaje point.

Arenas point.

On the W. side of the river, a little to the northward of Torrillo or Homenaje point, there are several rocks close in shore on which the sea breaks. In calm weather sometimes they cannot be easily distinguished, and are dangerous for boats. The outer part of the bar commences a short distance northward of Torrecilla point and takes a direction toward the light-house. At high tide there are from $14\frac{1}{2}$ to 15 feet of water on it.

To enter the river Ozama, a pilot should be taken, and it should be borne in mind that, the bar being composed of rocks, a smooth time and high water should be chosen, as a vessel drawing 10 feet would receive serious damage by even touching on the bar.

In case of emergency, however, a vessel may enter by observing the following directions:

Bring the signal-tower, at the SE. angle of the town, to bear N. and steer for it till the light-house on the bastion of San José bears NW. by W. Then haul up NE. by N. $\frac{1}{2}$ N., and steer in on this course till the extreme of Arenas point, on the E. bank, bears N. by W., when steer to pass it close to. After passing it stand up the river in mid-channel.

As the current in the middle of the river is sometimes very strong, a vessel had better moor head and stern close in shore.

The stream out of the river Ozama runs with great velocity.

Tides.

The rise and fall of the tide is about 20 inches, and the time of high water is uncertain. During the rainy season the depth of water on the bar somewhat increases.

When steering from seaward for the anchorage off Santo Domingo city, it will be useful to remember that a few miles to the eastward of the Cibao range of mountains, two small hillocks rise to a height of 200 or 300 feet above the plain; these appear as two islets long before the low shore is seen, and if kept on a N. by W. bearing will lead up to the anchorage.*

Winds.

During the winter months, and especially in the spring, the land and sea breezes succeed each other with tolerable regularity; but during the remainder of the year they undergo some interruption, particularly in the summer season. Frequently the fresh north winds on the S. coast of Santo

* Nav. Lieut. G. H. Shorte, H. M. S. *Druid*, 1876.

Domingo completely overcome the sea-breeze. Within the Ozama the land-wind blows from NNE. to NE., and the sea-breeze from S. to SSW. The first begins soon after sunset, and continues until 8 or 9 in the morning.

Between Beata point and Saona island, when the moon's age increases, the ebb-tide sets 12 hours eastward and the flood 12 hours westward. The ebb begins at 9 or 10 in the morning, and runs at the rate of $1\frac{3}{4}$ miles an hour. The rise of tide is a little more than 3 feet in Agujero Chico, and $1\frac{1}{2}$ feet at Nisao point. When the moon's age decreases, the waters run invariably to the westward, during the 24 hours, at from 1 to $2\frac{1}{2}$ miles an hour. The weather is then changeable, and at times strong squalls are experienced. Off this part of the coast of Santo Domingo, after fresh northerly or southerly winds, the current often sets eastward, and occasionally at other times. The westerly current strikes the coast between Beata point and the mouth of the Neiva, then turns to the NE. as far as that river, and thence eastward trending with the coast.

About 5 miles W. of Santo Domingo city is the mouth of the river Jaina.

Mahogany is shipped from here, but, as there is no shelter and bad holding-ground, vessels are obliged to lie a long way off shore, and can only receive cargo during calms or northerly winds.

The river Nigua empties into the gulf of Santo Domingo about 6 miles N. of point Nisao. On its S. bank, a short distance from the mouth, is the village of the same name. Although numerous vessels load here, the loading presents many difficulties. The bank of soundings is so narrow that vessels lie close in shore in 12 to 14 fathoms of water. The anchorage is entirely unsheltered, and strong breezes cause the sea to rise 13 to 15 feet above the ordinary level. Vessels can only load during northerly winds, and, indeed, a vessel's safety would be seriously endangered by remaining at anchor off the Nigua river with a wind from any other quarter. The place has the reputation of being very unhealthy.

The river Najallo empties into the sea a short distance S. of the Nigua river, and the anchorage is equally inconvenient and unsafe.

Port Palenque. Port Palenque is on the western side of the gulf of Santo Domingo, about 2 miles N. of point Nisao.

It affords sheltered anchorage, but very confined, with a depth of 23 feet of water over a gravelly bottom. The shore is very steep to, with 3 fathoms close in shore.

In entering or leaving this anchorage be careful to avoid a reef which extends SE. and NW. from the weather-point.

Nisao point. Nisao point is low, and descends to the sea by a gentle slope. Off the point a reef, inside which fishing-boats find shelter, extends WSW. for $\frac{1}{2}$ a mile. From here the coast takes a westerly direction for 36 miles to Salinas point, which is low and sandy, and may be recognized by the sea breaking over it.

Nisao roadstead. To the westward of point Nisao there is an open roadstead, where vessels load mahogany. Here the river Nisao empties into the sea, and vessels may anchor $1\frac{1}{2}$ or 2 miles off its mouth in from 7 to 9 fathoms. The bar is almost impassable, even for boats, on account of the rapidity of the stream, and the sea breaks at a distance from shore, making landing difficult.

Port Viejo. Port Viejo is an open roadstead about 4 miles W. of the mouth of the Nisao river. The anchorage is $1\frac{1}{2}$ miles off shore in about 7 fathoms of water.

This anchorage and that of Nisao road lie in a deep bight, between point Palenque on the E. and point Catalina on the W.

Catalina bay. Catalina bay, W. of the point of the same name, is but little frequented. There is no anchorage in its eastern part. In its western part small vessels only can anchor in 3 fathoms of water. A mile S. of Catalina point there is a shoal with 12 feet of water on it.

Sabana bay. Sabana bay is $3\frac{1}{2}$ miles to the westward of Catalina point, and affords good anchorage in 5 or 6 fathoms, sheltered by the latter point as far round as ESE.

Anchorage of Paya, Agua de la Estancia, and Estancia Colorado. The roadsteads of Paya, Agua de la Estancia, (the port of the village of Bani, 5 miles inland,) and Estancia Colorado, lie between Sabana and Salinas bays, and are all open and unprotected. Vessels lie from 2 to 3 miles off shore.

Salinas bay, situated E. of the point of the same name, and limited to the eastward by point Palmas, has, at 1 cable's length from shore, from 12 to 15 fathoms of water.

The best anchorage is with two hills, covered with palm-trees, on with a clump of the same species of trees near the shore, in the eastern part of the bay, and bearing between E. and E. by N. Small vessels anchor in 5 fathoms, and, as the bottom is so steep, they are obliged to run a hawser on shore to hold the ship in case the anchors drag.

From Salinas point the coast trends to the N. and NW., and then round to the SW., to Martin Garcia point, forming Ocoa bay.

Ocoa bay.

The latter point bears from the former about W. $\frac{1}{2}$ N. 18 miles, and, measured from this line, the bay is 12 miles deep.

The gulf of Ocoa is formed between Trujillo or Avarena point on the W. and Salinas point on the E., 23 miles apart. It is open to the southward, and the heavy sea which is caused by the prevailing winds when they blow strong renders the western shore dangerous to approach. The coast of the gulf is bordered by a sand-bank, generally narrow, but in places it extends off $1\frac{1}{2}$ miles; the western shore is also skirted by a reef, and the eastern shore partly so. At the head of the gulf there are two large bays; the Neiva or Juliana in the western part, and the Ocoa, which occupies all the northern and eastern shore.

In these bays are various ports and anchorages, some of which are formed by reefs; those in Neiva afford but moderate shelter; those in Ocoa bay are very good. The hill of Baduruco on the W., and the mountain of Martin Garcia to the NW. of the gulf, are conspicuous objects. To the eastward of the gulf are the plains or flats of Bani, backed at the distance of 4 or 5 miles inland by the chain of the Cerro Gordo.

The coast from Salinas point to Caldera point runs NE. by N. $1\frac{3}{4}$ miles; it is sandy and free from danger. Half-way between the two points the coast projects a little and forms Ranchos point, which is bordered at 100 yards' distance by a bank of coral and sand with 10 to 12 feet of water on it.

Ranchos point.

The entrance to the port of Caldera lies between point Matasola on the N. and point Caldera on the S. The latter point is flat and sandy, and terminates the peninsula of the same name, which is nearly all occupied by a large salt lake

Bay and port of Caldera.

and covered with brush-wood and palm-trees. The two points bounding the entrance are $\frac{1}{2}$ a mile apart, but the entrance is narrowed by banks on the northern side to a width of 300 yards, with depths varying from 4 to 9 fathoms.

Five hundred yards to the eastward of Caldera point banks extend nearly across the bay, from N. to S., dividing it into two parts, called the eastern and western anchorages. These banks have from 8 to 15 feet of water on them. The eastern anchorage is about $\frac{3}{4}$ of a mile in diameter, with from 5 to 7 fathoms of water, diminishing toward the shore, with muddy bottom. This anchorage is perfectly clear after passing the banks which divide it from the eastern anchorage. These in smooth weather can be easily seen, but with a breeze from SE. or ESE. the sea breaks everywhere and the channels are not easily distinguished. A stranger should take a pilot.

The western anchorage is of smaller extent, and is only about 500 yards in diameter, with depths of from $3\frac{1}{2}$ to 7 fathoms of water over gravelly and sandy bottom. These two anchorages are sheltered from all winds, but a sailing-vessel would be obliged to tow or warp in.

To enter the bay haul round Caldera point, at the distance of 100 yards, and as soon as the extreme of the point bears W., steer S. $\frac{1}{4}$ W. to avoid a small bank, the western extreme of which lies S. by E. $\frac{1}{2}$ E. 700 yards from the northern extreme of the point. Continue this course S. $\frac{1}{4}$ W. till the centre of a small bushy island close to the S. shore of the bay bears SE. by E., when haul up for it and anchor in about 7 fathoms of water as soon as Caldera point bears NNW. $\frac{1}{2}$ W. This course will carry a vessel about 200 yards to the eastward of a small coral shoal close to the western shore of the bay. Both of these banks can be easily distinguished from aloft by the discolored water above them. From this anchorage a depth of 3 fathoms may be carried into the eastern anchorage. For this the eye from aloft will be the best guide.

Water.

Water may be obtained from a small spring in the eastern part of the bay.

Tides.

The tides rise and fall in Caldera bay about 13 inches, but are much affected by the wind.

The establishment of the port is uncertain.

Outside of Caldera point is the anchorage of Playa Vieja. Anchorage of
Playa Vieja.
The best berth is with Caldera point bearing E. by S. 400 yards distant in from 11 to 14 fathoms. This is a safe anchorage except during the hurricane months.

In approaching Caldera, or any of the ports in the gulf of Ocoa, from the westward, a vessel, after weathering that part of the coast between Beata island and Avarena point, should make nothing, as the current which runs to the westward near Alta Vela sets to the eastward in approaching the gulf of Ocoa. It is, however, advisable to keep clear of the western shore of the gulf. If bound to port Caldera work well to windward, but do not stand to the southward of lat. 18° N.

From Matasola point the coast trends to the WNW. for $2\frac{1}{2}$ miles to Ocoa point. Between the two points are several rocky projections, and the coast is bordered by coral reefs extending more than 1 mile off shore.

Between these reefs and the shore is a channel, deep but dangerous.

Ocoa road, formerly called port Hermosa, is in the NE. Ocoa road.
part of Ocoa bay, about 10 miles to the northward of point Salinas. The limits of the road are the Caracoles river on the N. and Ocoa point on the S., 7 miles apart, between which the coast has a general N. and S. direction. The anchorages are well sheltered from the usual trade-wind, but the holding-ground, of sand and loose stones, is not good and anchors easily drag.

The usual anchorage off the entrance of the river is confined to a narrow ledge of sand, with rocky patches, very steep-to, and so close to the shore that a cable must be carried to the nearest palm-trees, keeping an anchor to the westward to check the vessel against the land-wind at night, which blows from the W. and WNW. The N. side of the river is the best. A large number of ships may, however, anchor here in safety; and at the beginning of the present century it was much resorted to by ships of war. The anchorage should not be approached before the sea-breeze is established, at about 10 a. m., and preparation must be made to meet the sudden and violent gusts which rush off

the land after passing Ocoa point, the S. extreme of the bay.

Caracoles anchorage.

The anchorage of Caracoles lies immediately to the northward of Ocoa road and abreast the mouth of the river Caracoles or Sipicepey. As good a berth as any may be found $1\frac{1}{2}$ miles off shore, with a depth of 5 or 6 fathoms of water. Landing on the beach is not difficult, but with southerly winds a heavy swell sets into the bay.

Azua bay.

Azua bay, into which the river Via or Bya empties, is open to the sea, which sets in heavily. While the sea-breeze blows vessels ride very uneasily. Boats can seldom tow wood to the ships after 11 a. m. There is not room to beat, and vessels are obliged to leave with the land-breeze.

There is a reef off the western point of the bay, and near the eastern point the bottom is very uneven.

Tortuguero.

Tortuguero, the port of Azua, is a fair anchorage.

The mountains in the neighborhood are covered with trees furnishing wood of a yellow color, fit for cabinet-work.

Port Escondido.

About 15 miles to the northwestward of Salinas point is port Escondido. The entrance to this harbor is $\frac{1}{2}$ a mile wide, and its western point is clear and steep-to, with $4\frac{1}{2}$ to 5 fathoms 100 yards off shore. The eastern point, lying more to the northward than the western one, is foul to the distance of 200 yards. Half a mile inside the entrance and in mid-channel there is a rocky shoal 400 yards long N. and S. and 200 yards wide.

In entering the harbor the southwestern shore must be kept aboard, at a distance of 2 cables, to avoid the rocky bank just mentioned, and large vessels should not go farther than one-third of a mile inside the entrance. One-fourth of a mile inside of this there is a depth of only $2\frac{1}{2}$ fathoms. Anchorage may also be found in 4 or 5 fathoms to the northward of the rocky bank, 600 yards from the entrance, but it is more exposed than the other. Small vessels drawing 13 or 14 feet may proceed farther in; for them port Escondido is an excellent harbor. Large vessels are exposed to winds from the S. or SE. which cause a heavy swell.

Puerto Viejo de Azua.

Puerto Viejo de Azua is the first anchorage in Ocoa bay, coming from the westward. It is a short distance N. of Martin Garcia point, and affords excellent and secure shel-

ter to small vessels. Having a depth of only 12 to 15 feet at the entrance, it is inaccessible to large vessels, which may lie outside in good weather in from 3 to 9 fathoms, but this outside anchorage is entirely exposed to the sea-breeze.

The entrance to the harbor is quite narrow and a reef lies off the N. point.

The mouth of the river Tavora or Tabara lies E. of Puerto Viejo de Azua, 1 mile distant. Tavora or Tabara river.

Point Martin Garcia, easily distinguished by some remarkable white cliffs, bounds on the N. and point Avarena or Truxillo on the S. the bay of Neiva or Juliana. Neiva or Juliana bay. The bay between these two points is about 10 miles wide, 6 miles deep, and open to the SE. The mountain of Martin Garcia becomes here a good landmark.

The river Neiva empties into the head of the bay about 10 miles W. $\frac{1}{4}$ S. from Martin Garcia point.

At the distance of half a mile NW. from the white bluffs of Martin Garcia is the anchorage of Rancho del Cura. Rancho del Cura. A good berth will be found, with a depth of 5 fathoms of water, 400 yards off shore and sheltered from the prevailing winds by point Martin Garcia.

This anchorage is separated by a point, remarkable for its red bluffs, from a small cove called Alejandro bay. Alejandro bay. This bay is bounded on the W. by the mouth of the river Neiva. It affords no good anchorage, and there are several rocks and shoals in it.

Barahona harbor lies on the W. side of Neiva bay. Barahona. It is a reef-harbor, and vessels require the assistance of a pilot to enter it. It is not a suitable place for large vessels. The reef is very steep-to, and at a distance of 4 cables there is no bottom with 118 fathoms, then suddenly the depth decreases to 5 fathoms, shoaling soon after to 10 feet.

The village of Barahona can be seen at a distance of 2 miles, and above it two ranges of hills, one above the other, each range having a saddle bearing WSW. from the village.

To enter the harbor, being abreast of Red Bluff point, bring these two saddles in one and steer WSW. This course will lead between the reefs in 4 to 5 fathoms of water. Having passed the weather-reef, anchor in 7 or 8 fathoms, with a small islet on the reef bearing W. There are other channels available for small vessels, leading closer in

shore. Care must be taken to avoid some sunken rocks to the northward of the village, called the Fishing rocks.

A short distance S. of Avarena point is the anchorage of Baburuco, which lies between two reefs and is dangerous and contracted. Small vessels only can anchor there, with a depth of 12 to 15 fathoms of water, $1\frac{1}{2}$ miles from shore. Three miles SW. of Baburuco is the anchorage of Mala-Pasa, easily distinguished by some white cliffs on shore. This anchorage is off the mouth of the river Nisaito, and like the anchorages of Nisaito and Naranjal, a little farther N., is a dangerous place for vessels.

Baburuco anchorage.

Anchorage of Mala-Pasa, Nisaito, and Naranjal.

Riocito.

A short distance S. of Mala-Pasa, and just N. of Carlos point, is the anchorage of Riocito. The shore is so steep-to here that vessels are obliged to lie in dangerous vicinity to it. It is exposed to wind and sea, and, although vessels load here in fine weather, it can by no means be considered a safe anchorage.

Petit-Trou, or Agujero-Chico.

The anchorage of Petit-Trou, or Agujero-Chico, lies 12 miles northeast of Gran Cape Mongon. It is extremely difficult to enter, and should not be attempted by any vessel drawing more than $10\frac{1}{2}$ feet, or without the assistance of a pilot. The holding-ground is rocky and not to be trusted. The anchorage is sheltered toward the eastward by a reef 3 miles long, having two cuts in it. The eastern one is 2 cables wide, with several sunken rocks in it, on one of which there are only $10\frac{1}{2}$ feet of water. The western passage has from 18 to 20 feet, but the part of the anchorage to which it leads is strewn with dangerous sunken rocks.

Tides.

To enter either of these passages, as before said, a vessel should not draw more than $10\frac{1}{2}$ feet, and should be guided by the eye from the bowsprit end. The best time for entering is between 11 a. m. and 1 p. m., when the various dangers may be more easily seen. During the increase of the moon the tides set 12 hours each way, the ebb to the E. and the flood to the W., at the rate of about 1 mile an hour. On the decrease there is no ebb at all, and the current increases to $1\frac{1}{2}$ knots. The rise and fall is about 3 feet.

Winds.

The sea breeze at Agujero-Chico sets in at 2 a. m. and blows till 7 or 8 p. m., when it veers to E. and E. by S. till near midnight. There is consequently little or no land-wind. The river Agujero-Chico empties into the harbor.

All this part of the coast abounds in game.

Gran Cape Mongon is a high promontory, which from a distance of 15 or 18 miles appears like an island. Gran Cape
Mongon.

In the interior will be seen the mountains of Baburuco, 2,400 feet high.

From cape Gran Mongon to cape Chico Mongon, or Beata point, the coast trends SW. for 8 miles.

This latter point is the southern extreme of the island of Santo Domingo and terminates to the S. by two salient points forming a small bay. Cape Chico
Mongon or Beata
point.

Beata island, off the point of the same name, is about 5 miles long N. and S. and 2 miles broad. The NW. point of the island bears W. by S. $\frac{1}{2}$ S. $7\frac{1}{2}$ miles from Cape Chico Mongon. The island is from 50 to 80 feet high, and is covered with trees and brushwood. Beata island.

The southern part is the highest; the northern point is long and low. From the northwestern point a bank with from 10 to 13 feet of water upon it extends $2\frac{1}{2}$ miles; on its outer edge are five small rocks called the Islets and the Table.

The eastern shore, extending NE. and SW., is bluff and steep-to, rising toward the S., with very deep water off it in some places. The SE. point is a steep bluff, having some small rocks off it. The S. coast is also formed of bluffs, and from the southwest point a ledge stretches off some distance. The western shore is clear and steep-to, and is skirted by a bank of soundings of variable depth. This shore affords good anchorage, and a good berth will be found in $7\frac{1}{2}$ to 9 fathoms of water, bottom of sand and weeds, with the following bearings: the NW. point of Beata island E. 1 mile distant, and the eastern point S. $\frac{3}{4}$ W. Anchorage.

To the northward and westward of Beata Island are five small rocky islets, the northernmost of which bears N. $\frac{1}{2}$ W. from the NE. point of the island, distant about 2 miles.

There is a breaker N. by E. from the island, but its exact distance cannot be given.

There is a heavy swell and variable current in the channel between Beata island and the main-land, and the depth is somewhat less than 3 fathoms. For a steamer of light draught it is, however, navigable by following these directions: Bring Cape Falso to bear NW. by W. $\frac{1}{2}$ W. and steer SE. by E. $\frac{1}{2}$ E. As Beata island is approached the change

in the color of the water will show the bank running off from both shores. The eye will be the best guide, as the shoals are easily seen from aloft. When abreast of Beata point the water will darken and deepen, and the easterly swell will be felt.

In coming from the eastward an opposite course will be steered. Alta Vela is a remarkable rocky, bell-shaped islet, 500 feet high, lying SW. $\frac{3}{4}$ W. $6\frac{1}{4}$ miles from the SW. point of Beata island. Three-fourths of a mile N. of the island there is a low black rock 100 yards long and 20 feet high, joined to Alta Vela by a bank with from 10 to 18 feet of water on it. A bank of soundings varying from 15 to 18 fathoms stretches off from 1 to $1\frac{1}{2}$ miles on the eastern and southern side. Anchorage may be found with the western point of the island bearing S. 1 mile distant, and the northern extreme NE. $\frac{3}{4}$ E., in a depth of $7\frac{1}{2}$ fathoms, sandy bottom.

The channel between Alta Vela and Beata island is quite clear, but the currents are strong and irregular, and it will, therefore, be more prudent to pass to the southward, on which side it may be approached within $1\frac{1}{2}$ miles.

Fraile rock lies 10 miles W. from the N. end of Beata island. It is about $\frac{1}{2}$ cable in extent, 50 feet high, and is steep-to, having 17 fathoms of water at the distance of 1 cable.

From a distance it appears like a group of sharp-pointed, white-topped rocks.

The current in this vicinity generally sets strongly to the westward. From Beata point to cape Falso or Lopez the coast trends to the NW., and as far as cape Roxo or Rojo, 8 miles N. of cape Falso, the coast is formed by vertical bluffs, which give a peculiar character to the small bays along the shore. These bays lie between the points of the cliffs, and are bordered by a narrow sand-beach, from which it is necessary to climb the bluffs or seek a ravine in them if it is desired to go farther inland. The coves or small bays of Rousselle, Sin Fondo, Thomas, Burgados, Truyes, and Vases afford examples of this singular conformation, particularly remarkable immediately to the westward of Beata point. The old descriptions of the coast of Santo Domingo give the name of *acculs* to the bays of this de-

scription. From the shore of the bays the summit of the cliffs is frequently very difficult of access.

Cape Falso or Lopez is the extremity of a long peninsula running E. and W., and 135 feet high. The cape is bold, clear of danger, and steep-to. South of cape Falso the coast trends to the ESE., and the land near it is level, forming a sort of table-land. Cape Falso or Lopez.

Between point Beata and cape Falso there are three small bays, only affording suitable anchorage for small vessels in from 8 to 11 feet of water. East of Burgados or Agujero Azul bay, the western of the three, a white sand-bank commences, which, bordering the coast to Beata point, connects it with Beata island by a narrow ridge, on which there are from $2\frac{1}{4}$ to $2\frac{3}{4}$ fathoms of water.

From cape Falso the coast takes an easterly direction to Chimahé point, forming Thomas bay between the two points. Thomas bay. Anchorage sheltered from S. and southwesterly winds may be found in the middle of this bay, in from $5\frac{1}{2}$ to 8 fathoms of water.

Between Chimahé point on the S. and a long cliff, called Agujas or Voûtes-d'en-bas, is Sin Fondo or Aguilas bay, $2\frac{1}{2}$ Sin Fondo or Aguilas bay. miles wide and $1\frac{1}{2}$ miles deep. It is skirted by a beach of coarse sand and gravel, with steep bluffs behind it. The depth varies from 12 to 8 fathoms, diminishing to $2\frac{1}{2}$ fathoms as the beach is approached. Good anchorage is found here, unsheltered, however, from westerly winds. A good berth is half-way between the two points and a little within a line drawn between them, in $7\frac{1}{2}$ or 8 fathoms; also 1 mile NNW. of Chimahé point, in 8 or 9 fathoms.

To the northward of the Agujas cliffs, which are 2 miles long, is Rousselle bay, having, like the bay just described, a beach of sand and gravel at the base of high cliffs. Rousselle bay. Vessels may anchor $1\frac{1}{2}$ miles off shore, in 8 to 11 fathoms of water, sheltered from N. round by E. to S. A river of the same name runs into the bay.

To the northward of Rousselle bay is a cliff 40 feet high and 2 miles long, called Trou Jacob cliff, the northern extremity of which is cape Roxo.

Between cape Roxo on the S. and Platform point on the N. is Trou Jacob bay, into which empties the river of the same name. Cape Roxo.
Trou Jacob bay. Anchorage, sheltered from the usual winds,

may be found in this bay in from 3 to 7 fathoms, with a bottom of coral or sand, with cape Roxo bearing SE. by S. or SSE. $2\frac{1}{2}$ miles distant.

The edge of soundings immediately NW. of the cape is only 1 mile off, but its contour is serpentine, and beyond 2 miles in the same direction the bank extends off nearly 4 miles from shore, with $4\frac{1}{2}$ to 12 fathoms of water on it. One mile to the westward of the cape there are from 11 to 20 fathoms of water.

Platform point. Platform point is a moderately high bluff with a flat top.

Pedernales or Pitre bays. To the northward and between it and point Pedernales or Pitre are two bays also called Pedernales or Pitre. The river of the same name which empties into the northern bay is a considerable stream and forms in part the boundary between the republics of Hayti and Santo Domingo.

Anchorage may be found abreast the low land of the northern bay or to the southward of the western point of the mouth of the river. The anchorage is easy of access and without danger. The coast in this neighborhood is formed of chalky cliffs with a few gravelly beaches. The anchorages are all open to the westward.

Piéges, Raccroc, Cochon, Grand-Gosiers, and Bœuf bays. From Pedernales point the coast takes a NW. direction for 12 miles to the village of Sale-Trou; between are the small bays of Piéges, Raccroc, Cochon, Grand-Gosiers, and Bœuf.

A remarkable range of red rocks, 3 miles long, lies immediately NW. of point Pedernales, terminating at point Piéges, the southern limit of the little bay of the same name. This point may be known by a remarkable white triangular cliff 220 feet high. Off the point $\frac{1}{2}$ a mile SE. of this cliff, $\frac{1}{4}$ of a mile off shore, is a ledge of rocks above water.

All the coast here is formed by white cliffs above a stony beach; soundings extend off for 2 miles.

Anchorage and village of Sale-Trou. The anchorage of Sale-Trou is limited to the westward by Bocachica point, formed of high white cliffs which extend for 3 miles to the westward at an elevation of from 500 to 700 feet above the sea. Behind these cliffs the land rises rapidly to the mountains of La Hôte, which reach, about NNW. of Sale Trou, a height of 9,000 feet. On the east the anchorage is bounded by point Predicador, a low point

to the eastward of which, $\frac{1}{2}$ a mile distant, is a small islet near the coast, not easily distinguished.

In the NW. angle of the bay, which is 2 miles wide, is the village of the same name. There is a beach of coarse gravel, terminated by a red bluff called Tapion, easily distinguished from a distance. Half a mile to the eastward of this cliff the river Sale-Trou empties into the bay. Small vessels may anchor abreast of the village, with from 17 to 20 feet of water, sand and mud. Large vessels must anchor 1 mile off shore in 7 or 8 fathoms, but the holding-ground is not so good. The anchorage is entirely open to the southward and is dangerous during the summer months.

A short distance W. of the white cliffs of Bocachica point is the river Salée bay, the western point of which is bluff, round, and surmounted by a small conical bill. At the head of the bay the river Salée empties over a beach of sand and gravel. Three miles to the westward is Coutelos bay, 3 miles wide and surrounded by high cliffs. This bay lies between Orange point on the W. and Colombier point on the E.; abreast of it the bank of soundings widens so that the edge is $1\frac{1}{2}$ miles off shore, with 16 to 18 fathoms of water.

Immediately W. of Orange point is the bay of the same name, bounded on the W. by the Morne Rouge, a remarkable square red cliff, with two hummocks on it. Orange bay has no beach. About the middle of it there is a small islet named Pativa.

To the W. of the Morne Rouge are several high white cliffs, 4 miles in extent; from it the coast takes nearly a W. direction for 17 miles to cape Maréchaux. The shore is steep to and in some places foul, so that with light airs sailing-vessels had better keep well off shore. The edge of the bank lies about $1\frac{1}{4}$ miles off shore; the depths are 19 or 20 fathoms 1 mile off shore, and 3 fathoms close to the beach.

The village of Cayes Jacmel lies about 13 miles W. of Morne Rouge; on the coast between them are several small bays of little or no importance.

The anchorage of Cayes Jacmel, 2 miles eastward of the village of the same name, affords but little shelter and is fit only for coasting-vessels. The village of Cayes Jacmel stands near the shore, 1 mile to the eastward of Belle-Roche

River Salée
bay.

Coutelos bay.

Orange bay.

Pativa island.

Cayes Jacmel.

point, and on the right bank of a small river of the same name. The anchorage extends 2 miles E. and W., and is nearly $\frac{3}{4}$ of a mile in breadth. The reefs and sand-banks are easily seen when the sun will admit. The entrance is open to the southward, and is $\frac{1}{2}$ a mile in breadth between the reefs and the white sand-banks which border the interior. Having entered, steer westward and anchor to the eastward of the village. To the eastward or westward there is some shelter from the sea from the southward, which is generally very heavy. There are several sandy beaches on the shore.

Sanzay bay.

Sanzay bay lies between Belle-Roche and Fournier points. It is approached through an opening in the reef, which, commencing at the latter point, skirts the shore at a distance of from $\frac{1}{2}$ a mile to 1 mile, 10 miles to the eastward, as far as Marigot point.

There are several cuts in the reef navigable for small vessels.

Off Belle-Roche point there is an islet of the same name.

Between Fournier point on the E. and Soye point on the W. is Banique bay, into which the Normands river empties. Soye point is long, narrow, and terminated by bluffs.

Banique bay.
Soye point.

From this to cape Maréchaux, 4 miles to the westward, the coast consists of high bluffs. Between these two points are the small bays of Arnaud and Fontaine.

Arnaud and
Fontaine bays.

Cape Maréchaux is a strip of table-land, $1\frac{1}{2}$ miles in length, ending in an abrupt bluff 100 feet high. This point is very steep-to, there being no bottom with 150 fathoms at $\frac{1}{4}$ of a mile off shore.

Jacmel bay and
town.

Jacmel bay is between cape Maréchaux and cape Jacmel, lying NE. by N. and SW. by S. from each other. At the head of this bay is the town of Jacmel, on the eastern bank of the Jacmel or Gauche river, which formerly flowed through several mouths into the bay. A dry spit of sand and shingle has formed across the mouths of the river, the water of which now finds its way round the W. end of the spit. In the middle of the bay no bottom can be obtained with 80 fathoms of line, but a bank of soundings, steep-to, skirts the shore at a distance of $\frac{1}{4}$ to $\frac{1}{2}$ a mile. To the southward of the town, a shallow rocky flat runs off to the distance of $\frac{1}{2}$ a mile.

From the offing to the eastward of Jacmel an excellent

landmark for its locality is a deep cut in the mountain-range back of cape Maréchaux. Should this notch be hidden by clouds, as it frequently is, a remarkable point, called Belle-Roche, situated to the eastward of cape Maréchaux, and off which there is a white rock of the same name, will be a good guide toward the bay.

As soon as the bay is fairly open, steer in midway between the two points, bringing the northernmost of two bluffs on the western shore to bear about NW. and steering for it till the citadel flag-staff comes in line with the centre of pier bearing NE. $\frac{3}{4}$ N. This line will lead up to the anchorage. As the bank of soundings where anchorage is practicable is very steep-to, the ship should be under easy sail or steam, ready to anchor at once on striking soundings.

The steam-vessels of the West India Mail Company call here twice a month.

Supplies of coal cannot be depended upon, but other supplies are plentiful. Supplies.

The watering-place is on the W. side of the bay, at a dark spot between two cliffs.

Land and sea breezes are generally very regular in Jacmel bay. A heavy swell rolls into the bay, and care must be taken to avoid being becalmed near the shore. Land and sea breezes.

With the land-breeze this may be avoided by keeping the valley open.

Pilots are very slow to board vessels, and their services are not necessary. Pilots.

From cape Jacmel the coast takes a W. $\frac{3}{4}$ S. direction to cape Bayaneta. The latter cape is the S. point of the bay of the same name; it may be easily recognized by the small white hills above the bluffs which form its base. Cape Bayaneta.

Bayaneta bay is open to the eastward and is clear of dangers. Under very favorable circumstances a vessel might anchor temporarily in 20 fathoms of water off the southern part of the sandy beach. There is a small village at the head of the bay, but no regular landing, and the sea sets in heavily. Bayaneta bay.

Between capes Bayaneta and Jacmel there are several small coves, but no shelter. This part of the coast is clear and steep-to.

From cape Bayaneta the coast trends W. by N. to Morne Rouge point, and becomes so straight, bold, and steep-to as to be called the Iron coast. It affords no shelter whatever against the sea-breeze, and the edge of soundings is only $\frac{1}{2}$ a mile off shore. About 6 miles W. of cape Bayaneta there are some high cliffs, and near them a small rocky islet. In the above space are several small bays, but they are of no importance. They are, proceeding from E. to W., Petite, Guigne-à-Gauche, Bresilienne, Gris-Gris, Fouquet, Calebas-sière, Grands-Haziers, and Petits-Haziers. These bays are all open to the S., and none are deep enough to afford shelter against wind or sea.

East Flamand
bay.

Immediately E. of the Morne Rouge is East Flamand bay, between False Diamond point on the W. and Flamand point on the E. It is entirely open to the southward, and affords no shelter. From Flamand point a reef extends 1 mile to the southward; to leeward of this reef coasters find temporary shelter from easterly winds. The water in this bay is from 7 to 11 fathoms in depth, gradually decreasing toward the shores.

All the projecting points and headlands on this part of the coast are bluff and steep-to.

Morne Rouge
point.

Morne Rouge, or Morro Rojo point, is of considerable elevation, and at some distance off appears a bold headland, but as it is approached it becomes known by five remarkable white hummocks near its extremity. The mountains near it rise to the height of about 1,000 feet. In a small bay on the E. side of the point there is a small rock, called the False Diamond. At a short distance from the point there are 10 and 11 fathoms water.

Aquin and
English bays.

From Morne Rouge point to cape St. George, abreast of Musquito cay, the distance is 8 miles, the shore between them being deeply indented, so as to form two large bights or bays, the eastern being called Aquin bay and the western English bay. These bays are partially protected to the southward by a chain of reefs and cays lying from 1 to 3 miles off shore, with clear channels leading into the bay between most of them.

In Aquin bay there is secure anchorage for vessels of light draught in $3\frac{1}{2}$ and 4 fathoms of water. In English

bay the water is deeper and the holding-ground is good, but the anchorage is not so well sheltered.

Grosse or Aquin cay, the largest of this chain of islets, lies about 1 mile to the westward of Morne Rouge point. It is 2 miles long E. and W., and from $\frac{1}{2}$ to 1 mile wide. Grosse cay.

It may be recognized by two remarkable white hills, from 300 to 500 feet high, and four white cliffs on its southern side. It is bold and steep-to on all sides.

Diamond rock is a small white rocky islet, half a mile eastward of Grosse cay, nearly in the middle of the eastern channel into Aquin bay, and about 600 yards westward of Morne Rouge point. The rock is bold on all sides except the N., whence a long, narrow ledge runs off nearly a mile to the NNW.

A little more than 1 mile W. of Grosse cay is Anguilla cay, small, nearly awash, and surrounded by a sand-bank about 200 yards wide. Anguilla cay.

Ramier or Pigeon cay lies 2 miles WSW. of Grosse cay. It is $\frac{3}{4}$ of a mile long E. and W., but very narrow. On its southern side are three remarkable white bluffs. Off its western end is a small cay, to which it is joined by a beach of sand and coral. Extending nearly $\frac{1}{2}$ a mile from the small cay to the westward is a reef with from $4\frac{1}{2}$ to 8 fathoms of water on it. Ramier cay.

Kansas reef lies SW. by W., $1\frac{8}{10}$ miles from the eastern end of Ramier cay. It is about $\frac{6}{10}$ of a mile long NE. and SW., and about $\frac{4}{10}$ of a mile wide. The depths on it are very irregular, the least being 4 feet, with spots as deep as 5 fathoms. The edge is very steep-to, the soundings decreasing suddenly from 10 fathoms to 3 fathoms. The sea generally breaks on it except in very smooth weather. A little less than $\frac{3}{4}$ of a mile NW. of this reef, and $1\frac{1}{5}$ miles SW. by W. $\frac{3}{4}$ W. from the small cay is a head of coral with only 2 fathoms of water on it and deep water all around.* Kansas reef.

Regalle cay, small and wooded, lies 1 mile ESE. of Ramier cay, and is surrounded by a sand-bank about 2 cables wide. Regalle cay.

The channels leading between the cays into English and Aquin bays are deep and clear. That between Morne Rouge point and Diamond cay is not to be recommended for a sail-

* Commander A. V. Reed, U. S. N.

ing-vessel, as the wind is apt to be baffling under Morne Rouge, and the ledge N. of the Diamond is to leeward. The channel between Diamond and Grosse cays is to be preferred. The channel between Grosse cay on the E. and Regalle and Anguille cays on the W. is clear and good. The passage between Ramier and Anguille cays is to be avoided, as it leads too near the Kansas reef. Between Ramier and Regalle cays vessels drawing more than 10 feet should not pass on account of a ridge of rocks extending to the westward of the latter islet. Between cape St. George and Ramier cay the channel is free of danger, but care must be taken to keep clear of the ledge S. of Ramier cay. Entering the bay by any of these channels the best anchorage will be found on the N. side of Grosse cay in 5 or $5\frac{1}{2}$ fathoms of water, keeping closer to the cay than to the Santo Domingo shore, on account of a bank with 9 feet of water on it which makes out $\frac{1}{2}$ a mile to the southward from the main-land. On the western end of this bank there is a

Trompeuse small islet called Trompeuse cay.

About $2\frac{1}{2}$ miles to the W. of English bay is a deep bight called St. Louis bay, affording excellent anchorage.

It is $1\frac{1}{2}$ miles wide and $1\frac{3}{4}$ miles deep, and, although open to the S. and SE., it is somewhat protected in the latter direction by some small cays.

Mosquito cay. Mosquito cay lies about 2 miles W. by S. from Ramier cay, and is 1 mile off shore. Orange cay, $\frac{3}{4}$ of a mile to the westward, is about the same distance off shore. On its west end are two hummocks 40 and 80 feet high.

Within these two cays are the small cays of Rat and Tinosá, or la Teigneuse, and close in shore, $\frac{3}{4}$ of a mile east of Bonita point, is Henri islet.

The points on each side of St. Louis bay are Pascal point on the W. side and Bonita point on the E. In the NE. corner of the bay is the town of St. Louis, and SW. of it, about $\frac{1}{2}$ a mile off shore, is the old fort of St. Louis, on a large rock. A quarter of a mile NW. of this fort is another small fort on a low point.

In entering St. Louis bay keep Pascal point, on the western shore, close aboard to avoid a sand-bank lying off it, nearly in mid-channel. Having cleared this, stand up the bay, and a good berth will be found in 7 fathoms of water, 3 cables W. of the old fort of St. Louis. Small vessels may

pass to the northward of the fort for an inshore berth. Half a mile SE. by S. from the old fort of St. Louis there is a small patch, with 15 feet of water on it.

In case of necessity a vessel may enter St. Louis bay by passing in NE. of Mosquito cay and close to the northward of Rat cay, between the latter and Tinoso cay. The channel is narrow, however, and there are said to be several shoals between Rat island and Bonita point.

In St. Louis bay the time of high water is uncertain. Tides rise and fall from 2 to 3 feet. Tides.

The winds from March to September are from SE.; from September to March, from ENE. Winds.

Near the coast, to the W. of St. Louis, the wind is NE. or E., while at the same time N. of cape Tiburon it blows from SE.

The head of St. Louis bay is separated from Meste or Mella bay to the westward by a neck of high land $1\frac{1}{4}$ miles wide. To the southward this neck widens into a peninsula, deeply indented, half-way between the two larger bays, by Little Meste or Mella bay, an inlet $\frac{1}{4}$ of a mile wide and 1 mile deep. The shores are bold, and, although open to the southward, shelter from other winds may be found in it, with from 4 to 6 fathoms of water, and good holding-ground. Little Meste bay.

To the westward of this peninsula is Great Meste bay, likewise open to the southward, but affording good anchorage to vessels of any size. Great Meste bay.

Between point Boyet on the E., and point St. Rem or San Remigio on the W., the entrance is $\frac{2}{3}$ of a mile wide, and entirely free of danger. There are 13 fathoms of water at the entrance, diminishing gradually toward the head of the bay.

Between Boyet point and Little Meste bay are the Almacenes cays, close in shore. Almacenes cays.

At a distance of $1\frac{1}{2}$ miles from the coast, and to the northward of the cays and sand-banks which border the N. coast of Vache island, is Mella or Meste bank, consisting of four shoals lying between the meridian of Toulau point (the eastern point of the entrance to Flamand bay) and that of Boyet point, (the eastern point of the entrance to Meste bay.) They are all of small extent, steep-to, and when the sun is shining brightly may be seen from aloft. It is probable that the Meste bank.
Mella bank.

bank is still changing. The outer shoal is about $1\frac{1}{4}$ miles from the shore.

The western shoal has a depth of 12 feet and lies SE. $\frac{1}{4}$ S., nearly a mile from Toulau point, and SW. by W. $\frac{1}{2}$ W. from Boyet point.

The other three shoals lie within $\frac{3}{4}$ of a mile of each other. The middle and largest is nearly circular, about $\frac{1}{4}$ of a mile in diameter, has 6 feet on its shoalest part, and bears from Boyet point S. by W. $\frac{1}{2}$ W. $1\frac{1}{4}$ miles distant, and from Toulau point ESE. The remaining two, with 12 feet water, bear ENE. and NW. $\frac{1}{2}$ N., 3 cables from the largest shoal.

By keeping $1\frac{1}{2}$ miles off shore a vessel will pass in 7 fathoms clear of all dangers, no shoals nor rocks having been found S. of this limit. Passing $\frac{1}{2}$ a mile outside the line of the headlands will lead through the channel between Mella bank and the main, but in using this channel the lead should be kept constantly going, as the soundings are very irregular.

Flamand or Flamancos bay is a deep inlet 2 miles W. of Meste bay. It is $2\frac{1}{2}$ miles deep and about $\frac{1}{2}$ a mile wide.

Its entrance lies between Carenero island on the W. and Toulau point on the E. The eastern side of the bay is skirted by a bank and must not be approached by a ship nearer than 200 yards until to the northward of a salient point about 1 mile N. of point Toulau. The S. side of Carenero island is also foul to the distance of 600 yards. During the fine-weather season good anchorage will be found just inside the entrance, but in the hurricane season a vessel should proceed farther up the bay.

The heat and the mosquitoes are said to be almost unbearable here during the summer season.

The bottom is everywhere mud.

On the western shore close to the little village of Renon there is a completely sheltered cove, with from $1\frac{1}{2}$ to 2 fathoms of water, called the Trou de Forban.

Trou de Forban.

On going to sea from Flamand bay vessels pass to the westward of Vache island, as hereafter directed, and generally take a pilot, upon whom, however, but little dependence can be placed, and a vigilant lookout will be necessary.

Caballon bay.

Immediately W. of Carenero is the bay of Caballon, limited to the westward by Caballon point.

The W. side of the bay is called the *Manchon de Caballon*. It is composed of three remarkable white cliffs at the extremity of a hill which separates two deep ravines.

In approaching the point care must be taken to avoid a shoal called the *Mouton*, nearly awash, lying 300 yards SE. of the point, and with only 7 feet of water on it.

Mouton shoal.

Between the *Mouton* shoal and the shore there is a passage with from $5\frac{1}{2}$ to $7\frac{1}{2}$ fathoms of water, very narrow, however, and liable to flaws of wind and calms in consequence of the high land in the vicinity. It is only fit for small coasters. The *Mouton* shoal is $2\frac{1}{2}$ cables long E. and W., and $1\frac{1}{2}$ cables wide.

Another shoal lies nearly midway in the entrance, called the *Caballon* bank, with $2\frac{1}{4}$ fathoms of water on it, and having an extent of 600 yards NE. and SW., with a width of 1 cable. It may be passed on either side. Although *Caballon* bay is quite large the anchorage is limited. The western part is steep-to, with a rocky bottom. The anchorage is on the eastern shore, where deep water may be found close to the mangrove-trees. The anchorage is sheltered from the SE. by *Carenero* island.

Caballon shoal.

From *Caballon* bay the coast trends to the SW. for 9 miles, then curves to the SE. for about 5 miles to *Abacou* point, forming the great bay of *Cayes*.

Bay of Cayes.

The town of *Cayes*, or *Aux Cayes*, lies 3 miles SW. of *Caballon* bay; between them, close in shore, is the small islet of *Compañia*. One and a half miles SW. of the town is the village of *Vieux Bourg*, off which is the road of *Chateaudin*, and still farther to the SW., $1\frac{3}{4}$ miles from *Vieux Bourg*, is the little village of *Torbec*. Numerous small streams empty into the bay, the largest being the *Acul* river, 3 miles SW. of *Torbec*. Many reefs and dangers lie off the coast and on the N. side of *Vache* island.

Aux Cayes.

Vieux Bourg.

Torbec.

The various charts of the bay of *Cayes* differ very much, and the hydrography of this vicinity, like that of the greater part of the coast of *Santo Domingo*, is exceedingly defective. It becomes consequently difficult to reconcile the different authorities from which this work is compiled. These directions must therefore be cautiously followed till a further examination shall either correct or confirm them.

In approaching *Aux Cayes* the island of *Vache* affords a good landmark. The island is 8 miles long W. by N. and

Vache island.

E. by S., and about 2 miles wide. The eastern part is low and thickly wooded; the western part is composed of small detached hills, about 100 feet high, which from a distance of 10 or 12 miles appear like separate islets.

From the E. point the S. shore runs nearly straight, and is skirted by a reef lying $\frac{1}{4}$ to $\frac{1}{2}$ a mile off shore. Along the eastern part of the island there are from 4 to 8 fathoms within $\frac{1}{4}$ of a mile of the reef; but W. of the middle of the island the water is shallower, and 3 or $3\frac{1}{2}$ fathoms will be found $\frac{1}{2}$ a mile off shore.

One mile S. of the Diamond rock or islet, off the western point, there are 6 to 7 fathoms, decreasing toward the shore. The shallow ground can be generally seen.

Diamond islet is not easily distinguished, being of the same color as Diamond point, from which it is only distant 20 feet, and is not easily recognized more than 1 mile distant.

Diamond point. Diamond point is the central one of three detached white cliffs in the northwestern part of Vache island.

The soundings between Lataniers and Diamond points are irregular, and in approaching the anchorages off the NW. part of Vache island it will be prudent to keep at least $1\frac{1}{2}$ miles off shore.

Lataniers point. Lataniers point, the SW. extreme of Vache island, is low and thickly wooded. At $1\frac{1}{2}$ miles off the point there are from $5\frac{1}{2}$ to 10 fathoms; $\frac{1}{2}$ a mile further in shore the water is much shoaler.*

Between Diamond point and the NW. point of Vache island there are two coves, the northern of which is called Agua bay.

Temporary anchorage may be found about 1 mile off this part of the island in 5 or $5\frac{1}{2}$ fathoms of water, sandy bottom.

The NW. point of the island is surrounded by a sand-bank with $1\frac{1}{4}$ fathoms of water on it, which extends 1,000 yards off shore and as far eastward as the western point of Feret bay.

Feret bay. Feret bay is about $\frac{3}{4}$ of a mile eastward of the NW. point of Vache island, and at its eastern point of entrance is the high white islet of Raquette, connected to it by a reef. The

* Nav. Lieut. G. H. Shorte, R. N., 1876.

bay is small and nearly $\frac{1}{2}$ a mile across at its entrance, where there are 5 and $5\frac{1}{2}$ fathoms water, which diminishes gradually inward to 2 fathoms. Small vessels in entering the bay should keep midway between the points, and anchor in the middle of the bay, avoiding the white sand-bank with $1\frac{1}{4}$ fathoms on it, easily seen, and which borders the salient points and shores of the bay.

From Raquette island eastward the N. coast of the island is bordered by a white sand-bank, with several cays and reefs. The bank extends off about $\frac{1}{2}$ a mile as far as Rochers point; thence the edge curves to the northward westward of West cay, which is covered with trees, at $1\frac{1}{4}$ miles NE. of Raquette islet; then round a group of islets, the most northern of which is named Agua, covered with large trees, and more than 3 miles from Vache; it then trends in the direction of East cay, lying within the edge of the great reef of this name, and which extends 4 miles northward from the E. end of Vache.

East cay, situated just within the edge of the reef, lies N. by W. $\frac{1}{2}$ W. 4 miles (approximately) from the E. point of Vache island. The cay is small and low, but well marked by a grove of cocoa-nut trees and some fishermen's huts. East cay.

About a mile SSE. from East cay is a small sand-bank 5 or 6 feet above water, situated also just inside the edge of the reef.

The edge of East reef, extending from the E. point of Vache island round the adjacent cays East and Agua to the NW., is tolerably well defined by an almost constant break or ripple, as also by several small rocks above water. By day the reef may be approached with safety, provided a good lookout be kept, but at night the utmost caution is requisite. No outlying dangers are apparent. East reef.

The *red* light formerly shown from the E. end of Vache island has been discontinued.

Great reef is an extensive white sand-bank southward of the town, upon which at the NW. and SE. parts are two heads of coral partly uncovered. These banks, extending from abreast Cayes to nearly half-way toward the island of Vache, and along the shore for one mile SW. of Torbec, shelter the anchorages of Châteaudin. A ledge extends from Great reef to the NW. point of Vache island, the depths on which are from $2\frac{1}{2}$ to 5 fathoms. Great reef.

The inner anchorage of Cayes is very limited, has only about 13 feet water, and difficult to enter or leave. That of Châteaudin is separated from it by a narrow tongue of white sand, which leaves the shore and joins the northern part of the Great reef; small vessels pass over it from one anchorage to the other. The Châteaudin anchorage is well sheltered, and extends from Principe point, W. of the village of Torbec, as far as Châteaudin point. The soundings diminish regularly from $4\frac{1}{2}$ fathoms at its southern part to $2\frac{3}{4}$ fathoms near the tongue of sand separating the two anchorages, and as the shore or reef is approached.

The entrance to Châteaudin road, between the W. end of Great reef and Maho point, is about $\frac{1}{2}$ a mile in breadth and carries 15 feet water. Vessels anchor in about 17 feet, sand and mud, at $\frac{1}{2}$ a mile from the shore off the village of Torbec or that of Vieux bourg. Those of large tonnage anchor in 7 or 8 fathoms southward of Compañia islet.

Étron-du-Porc.

In the middle of Cayes bay, and nearly midway between the NW. point of Vache island and the western shore of the bay, is a dangerous small rocky shoal, awash, called Étron-du-Porc. It lies W. $\frac{1}{4}$ N. distant $3\frac{1}{2}$ miles from the NW. point of Vache island; N. from the eastern extremity of the cay nearest Abacou point; and S. by W. $\frac{1}{2}$ W. from the middle of the town of Cayes. This shoal has 4 fathoms water close to. Vessels should pass eastward of it.

The western channel to Cayes through the bay of Cayes, and between the NW. part of Vache island and Great reef, is no longer used by large vessels. Shoals other than those shown on the plan are reported to have grown up and the water generally to have shoaled. Several steam-vessels having grounded, this route is only used now by small vessels; the eastern channel is generally preferred. Vessels passing along the S. shore of Vache island should give it a berth of at least 1 mile.

To reach Cayes anchorage, bring the E. point of Vache island to bear W. and then steer N. for Orange cay. When the N. point of Agua cay comes in line with East cay, bearing WNW., alter the course to NNW., keeping some white cliffs in Little Meste bay on the starboard bow; continue this course until East cay comes in line with the NW. extreme of Vache island, bearing W. by S., and then alter the

course to WNW. On this course the first soundings with the hand-lead in 10 fathoms of water will be obtained just after passing East cay. Continue to steer WNW. until the E. end of Agua cay bears SW., when the water will deepen suddenly; the water is, however, so clear that it appears much shoaler.

When the N. extreme of Agua cay comes in line with the NW. point of Vache island SE. by S. $\frac{1}{4}$ S., a course W. by N. $\frac{1}{4}$ N. should lead a vessel clear of Great reef to the anchorage. A good berth will be found in 7 fathoms, sandy bottom, with a white cliff just open of Compañia islet N. 49° E., Battery point N. 13° W., and the British consul's house N. 67° W.

In proceeding to the eastward from Cayes anchorage, steer E. by S. $\frac{1}{4}$ S., and when East cay bears S. a course to the southward and eastward may be shaped. Dryad rock.

Several shoal heads have been reported in Cayes anchorage. Dryad rock, on which there are $2\frac{1}{4}$ fathoms of water, lies nearly $\frac{3}{4}$ of a mile SE. $\frac{1}{2}$ E. from Battery point. Many of the discolored patches are, however, caused by dark weeds growing on the bottom; it will, however, be prudent to avoid the dark patches as much as possible.

Battery point is readily distinguished by its fortifications, and is well clear of the houses in the eastern part of the town. The towns of Aux Cayes and Jacmel are next to Cape Haytien in commercial importance. Political matters are frequently in a very disturbed state; but, except when fighting is actually going on, provisions, fresh meat, and vegetables can generally be obtained. Battery point.

If the anchorage in Châteaudin road is preferred, having brought the NW. point of Vache island to bear SE. by E. $\frac{1}{2}$ E. about 2 miles distant, steer NW. by W. $\frac{3}{4}$ W., which course will lead about a mile northward of Étron-du-Porc, and toward Mabo point, in from 5 to 8 fathoms water; on nearing the latter a beacon with a *white* flag on it, at the SW. end of Great reef, should be sighted, which must be left to the eastward.* Having rounded the reef, which is easily seen, haul up along shore, keeping in from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms of water, and anchor a little eastward of Vieux bourg. In approaching any of the anchorages in Cayes Châteaudin road.

* This beacon cannot always be depended upon.

bay a stranger should have the assistance of a pilot; but it must be remembered that implicit confidence is not to be placed in them.

The winds in Cayes bay are pretty regular. The land-wind comes off from the NW. and veers round gradually to the NE. until about noon, when the sea-breeze sets in from the SE. and veers to the S. toward evening.

Abacou point. Abacou point is low and skirted by a reef, said by some authorities to extend off nearly 1 mile, but Captain Owen, R. N., says only 1 cable. Commander Haxton, U. S. N., reports a small reef stretching off shore between Gravois and Abacou points, and extending $1\frac{1}{2}$ miles off shore, but with deep water in shore of it. Until a more thorough examination is made the shore between these two points should not be approached. The coast from Abacou to Gravois point is low, but a short distance inland the land rises to the height of 1,080 feet.

Diablo bay. Between point Abacou and point Gravois there are two small bays, called port Nonnettes and Diablo bay. The latter is immediately W. of Abacou point, and has a small sandy beach at the head of the bay, over which a brook empties. The western point is bluff, and skirted by a reef to the distance of 2 cables.

Port Nonnettes. Port Nonnettes is a little inlet open to the southward, and, like Diablo bay, has a sandy beach and the mouth of a small stream at its head. Both points of the entrance are bordered by reefs to the distance of 2 cables. Coasters find temporary shelter from the prevailing winds in these two bays. Port Nonnettes is $3\frac{1}{2}$ miles E. of point Gravois.

Laos shoal and Leighton rock. The Laos shoal and Leighton rock have never been found by those engaged in searching for them, and probably never had any existence. After a prolonged and fruitless search for them by H. M. S. *Philomel* and *Plover*, in April, 1872, the British Hydrographic Office ordered them expunged from their charts as imaginary dangers.

The alleged positions of these dangers were: Laos shoal, latitude $17^{\circ} 45' N.$, longitude $73^{\circ} 30' W.$; Leighton rock, latitude $17^{\circ} 37' N.$, longitude $73^{\circ} 21' W.$

Gravois point. Gravois point is thickly wooded and is 60 feet high. It is steep-to, there being 45 to 50 fathoms of water $\frac{1}{3}$ of a mile off shore.

ERRATUM.

Page 315, the sentence commencing in the third line from top should read: "It affords several unsheltered anchorages, all of which, open to the heavy swell, are very unsafe with the wind from the SE. and southward."

From Gravois point to point Burgos the direct line is NW. by W. $\frac{1}{2}$ W. and the distance 33 miles. The coast between these two points forms a deep bight and is very imperfectly known. It affords several unsheltered and southward. With the wind from SE. the swell is very unsafe anchorages, all of which are entirely open to the heavy.

Port Salut lies between a low point on the N. and a bluff point with a small hill on it sloping to the eastward on the S. In this small bay three rivers empty, and a small village of the same name is situated on its shore. NW. of this village there is a remarkable white bluff, abreast of which small vessels anchor. Two miles farther to the NW. there is a dry sand-bank, $\frac{1}{2}$ a mile off shore. There is also said to be a coral patch with 12 feet of water on it abreast of the village and about 1 mile off shore.

Port Salut.

The low point on the N. side of port Salut separates it from Drick bay, a small cove surrounded by high land. A small stream empties into the bay, and it is separated from Juif bay on the N. by a large, broad point composed of high cliffs and overlooked by high land. The anchorage is in the middle of the bay, in 4 or $4\frac{1}{2}$ fathoms of water. Juif bay, immediately to the northward of this latter point, is bounded on the N. by Juif point, formed of steep bluffs. Its entrance is $1\frac{2}{3}$ miles wide. At the head of the bay there is a village on a round, salient point, to the northward of which a river empties. The land around the bay is very high, and is intersected by two deep ravines extending into the interior. Anchorage will be found in the middle of the bay, abreast of the village, in 5 to 6 fathoms of water.

Drick bay.

Juif bay.

The bay of Roche-à-Bateau, $1\frac{1}{2}$ miles NW. of Juif bay, is bounded on the north by point des Roches. A small river empties into the NE. part of the bay. The anchorage is said to have $5\frac{1}{2}$ to 6 fathoms of water.

Bay of Roche-à-Bateau.

Immediately NW. of point des Roches is Coteaux bay, with Coteaux point as its northern limit. These two points are skirted at the distance of $1\frac{1}{2}$ cables by reefs. There is a third point making out from the shore of the bay S. of the village, which is built partly on the beach and partly on the hills behind it. A small stream empties into the bay N. of the village. The anchorage is in the northern part of the bay and to the westward of that part of the village

Coteaux bay.

lying on the beach. In this berth 5 or $5\frac{1}{2}$ fathoms of water will be found, decreasing to $1\frac{1}{4}$ fathoms $\frac{1}{2}$ a cable from shore. Vessels in entering should take care to avoid the reefs off the points.

Damassin bay. The small bay of Damassin lies $2\frac{1}{2}$ miles NW. of Coteaux bay. A small river empties into the NE. part of it. From the scanty information we have regarding it, it seems to be clear and sheltered from the N. and E.

Port Piment. Port Piment is 1 mile NW. of Damassin bay. It is sheltered from NW. round by N. to SE.

On the SE. side of the bay a river empties into the sea, and near it is a village on a high and prominent point which bounds the bay on the S. The anchorage is with the town bearing ESE. 1 mile off shore, in about 7 fathoms of water, which depth gradually diminishes toward the shore.

Bay of Three Rivers. Two miles in a northeasterly direction from port Piment is the bay of Three Rivers, so called from the three small streams which empty into it. It is entirely open to the southward, but with winds from the N. or E. it affords temporary anchorage. There are no dangers in it, and 1 mile off shore there are 7 to 8 fathoms of water, decreasing to $2\frac{1}{4}$ fathoms 400 yards off shore. At the head of the bay and back of the beach there is a village on a remarkable hill 150 feet high, the base of which is formed of red bluffs.

Salée bay. The bay of Salée is immediately to the westward of the bay of Three Rivers. It is quite small, surrounded by high land and remarkable for two white bluffs which form the points of entrance.

A river of the same name empties into the bay, and on the shore is a small village.

Acul-à-Jean. Acul-à-Jean is a small bay, bounded on the W. by the Morne aux Anglais, or Morro de los Ingleses, and on the E. by a bold round point called la Chardonnière, or Cárdisales.

At the head of the bay, which is surrounded by high land, is a village. Like all these anchorages, it is entirely open to the southward, but vessels may anchor 1 mile off shore in 7 or 8 fathoms of water.

Bay of Anglais. The bay of Anglais, between the Morne aux Anglais and the Tapion of Cahouane, is unsheltered and inconvenient. Temporary anchorage may be had in 6 or 7 fathoms of water SE. of some houses on the shore. Half a mile from

these houses the river Anglais empties into the sea, but the surf is too heavy to obtain fresh water.

From the Tapion de Cahouane to point Aigrettes, 6 miles to the westward, the coast is low with occasional pebbly beaches. Back of the shore the land rises rapidly, leaving between the sea and the hills a narrow plain cut up with lagoons.

All this part of the coast between the above-mentioned points is skirted by reefs and a white sand-bank to a distance varying from 2 cables to $\frac{1}{2}$ a mile off shore. A portion of the reef between point Aigrettes and Grande point, 4 miles to the eastward, is uncovered. In this reef, $1\frac{1}{3}$ miles E. of point Aigrettes, there is an opening $\frac{1}{3}$ of a mile wide, leading to an anchorage, $\frac{1}{2}$ a mile in extent, where small coasters find shelter against the prevailing winds. This anchorage is called Vieux Boucan. At its entrance there are $3\frac{1}{2}$ and $4\frac{1}{2}$ fathoms of water, diminishing to $2\frac{1}{4}$ and $1\frac{1}{4}$ fathoms inside. There is a small shoal or rock in the middle of the harbor.

Vieux Boucan.

The reefs and sand-banks off this part of the coast are easily perceived, but it should not be approached unless in case of necessity.

The bank of soundings extends 2 miles off shore, with depths of from $6\frac{1}{2}$ to 11 fathoms. In case of necessity, anchorage may be found off Milieu bay, between point Burgos and point Aigrettes, and also between Grande point and the Tapion de Cahouane, in 6 to 8 fathoms, but there is no shelter, and generally a heavy sea rolls in.

Milieu bay.

Point Aigrettes has a small round hill upon it. Its base is composed of white cliffs, and from a distance it appears like an island.

Point Aigrettes.

Burgos point, on the W. side of Milieu bay, is moderately high, and is skirted by a reef 1 cable's length off shore, which continues for 1 mile to the eastward.

Burgos point.

From Burgos point the coast runs $\frac{3}{4}$ of a mile NNE., when it turns sharply to the eastward, trending W. $\frac{3}{4}$ N. for 2 miles to a bluff rocky point, and then takes a WNW. direction to cape Tiburon, forming the bay of Tiburon. The two points are $2\frac{1}{3}$ miles apart, and the bay is 1 mile deep. The N. shore of the bay is bold and backed by high hills; at the head of the bay there is a small, three-cornered plain,

Tiburon bay.

with high land on two sides. The village of Tiburon is in the SE. angle of the bay, protected by a small battery, and the river of the same name empties into the sea N. of the village. The edge of the bank of soundings extends $\frac{3}{4}$ of a mile S. of cape Tiburon and about 2 miles from the head of the bay. The anchorage is not sheltered toward the W. or S. Small vessels only can find shelter from southerly winds N. of Burgos point and abreast of the village.

Anchorage.

The best anchorage is with Burgos point about S. by E and cape Tiburon WNW., in 4 or 5 fathoms of water with a bottom of stiff clay. There are 4 and $4\frac{1}{2}$ fathoms 1 cable from the shore; throughout the bay and on the N. shore there are 6 and 7 fathoms at that distance.

No difficulties present themselves in entering Tiburon bay except those occasioned by the flaws and heavy squalls which come down off the high land. There is no danger to be avoided but the reef along the shore near cape Tiburon and that off point Burgos.

Water.

Water is easily obtained from the river, the mouth of which is marked by the five-gun battery which defends the shore.

Wood and fresh provisions can also be procured.

Cape Tiburon.

Carcasses point and cape des Fous, or Locos point, a little to the southward, from a distance seem to be one bold round point ending in cape Tiburon. The three appearing as one are commonly called by the general name of cape Tiburon, which name properly belongs only to a massive, lofty promontory about 700 feet high, rising abruptly from the shore and then ascending gradually, forming 1 mile in shore a round-topped mountain 2,850 feet high, also called Tiburon; the western extremity of the extensive range called La Hotte.

Mt. Tiburon.

Cape des Fous.

Cape des Fous is skirted by a reef 200 yards off shore, on which are several dry rocks. The reef extends along the coast to the entrance of Tiburon bay and is very steep-to. Close to it there are 13 fathoms of water; 2 cables off, 22 fathoms; and a little farther off, no bottom with 45 fathoms of line.

Carcasses bay.

Carcasses bay is between the point of the same name on the S. and Figuiers point on the N., $\frac{2}{3}$ of a mile apart. Between the points there are 7 fathoms of water, decreasing toward the shore. Three brooks empty into the bay over a

small beach, northward of which there is a hut on a little hill. The land round Carcasses bay is very high, like the rest of this part of the island. The bay is clear, but offers little shelter. Small vessels anchor in the middle of it in 5 or $5\frac{1}{2}$ fathoms of water, bottom of mud and sand. Large vessels may anchor about $1\frac{1}{4}$ miles off either point in 11 or 12 fathoms.

To the northward of Figuiers point, and between it and point Irois, is Irois bay. ^{Irois point and bay.} Point Irois is the western extreme of Santo Domingo, and, although not high, may be distinguished by a small hill on its extremity, which from a distance has the appearance of an island. The point is steep-to, and both it and the bay are clear of danger. The bay is 2 miles wide and $\frac{1}{2}$ a mile deep; on its NE. shore is the village of Irois, on a small plain watered by the river of the same name. A little southward of the mouth of this river there is a cluster of black rocks, a short distance off shore, on a white sand-bank; another brook or rivulet empties into the bay a little S. of these rocks.

Between the points of entrance there are 9 to 11 fathoms of water, gradually decreasing in depth toward the beach.

To anchor in Irois bay, haul round Irois point, at a short distance, and anchor in 7 or 8 fathoms of water, sand and shells, with the largest of the group of black rocks bearing ESE. distant 800 yards, or in $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms, sand and mud, with the same rock bearing S. $\frac{3}{4}$ W.

The holding-ground here is good, but a heavy swell frequently sets in, making landing difficult and a ship uneasy.

Between point Irois and point Fanchon are the two small ^{Bigie and La Croix bays.} bays of Bigie and La Croix, open entirely to the westward and separated by a bluff conical point, rising abruptly from the sea. Bigie bay is surrounded by a sandy beach. On one of the spurs of the point there is a house near the middle of the bay.

In St. Croix bay there is also a sandy beach, and a small stream empties into it.

These bays afford no shelter from westerly winds, but temporary anchorage may be had in from 8 fathoms, $\frac{3}{4}$ of a mile off shore, to 12 fathoms, $1\frac{1}{2}$ miles off shore, sandy bottom.

Espagnol bay. Espagnol bay lies to the northward of Fanchon point, which is broad and bluff. Its northern limit is Ibard point. Its shore is bordered by a white sand-bank or reef extending a cable's length off shore.

This bay is quite small and does not afford a desirable anchorage. Large vessels may anchor abreast it in 6 or 7 fathoms.

Bay of Pierre Joseph.

To the northward of Ibard point is the bay of Pierre Joseph, or Pedro José, sheltered to the northward by the point and island of the same name. The point is low and sharp, and the islet is connected with a reef which skirts the entire shore of the bay as far as Point Ibard, at a distance of 2 or 3 cables off shore. The reef is steep-to, with $1\frac{1}{4}$ fathoms of water on it. From Ibard point to the islet the distance is 2 miles, and from this line the depths gradually diminish from 4 to 2 fathoms on approaching the shore. In the northern part of the bay there are several hidden dangers. A rocky head, $\frac{1}{2}$ mile S. by W. of the islet, has 5 feet of water on it and 4 fathoms all around. SE. $\frac{1}{2}$ S. of the islet, at the same distance, is a rocky shelf with 5 to 10 feet of water on it, 15 feet around it, and having an extent of 2 cables in length and 1 in breadth. A third rocky head with 8 feet on it lies 2 cables E. of the preceding. The bay of Pierre Joseph is surrounded by high land. At the foot of these hills and along the shore, where there is a sandy beach, are the scattered houses of the village of Pierre Joseph. To the southward of the village a river affording good water empties into the bay.

A small vessel anchoring in Pierre Joseph bay should bring the southern houses in the village to bear E. to avoid the above-mentioned dangers, and anchor in 18 feet of water with the islet bearing N. by W.

Large vessels should anchor in 7 fathoms with the islet bearing NE. by E. When the sky is clear the bottom can be distinctly seen and the dangers avoided.

Laborie bay.

The reef which sweeps round Pierre Joseph point and bay also skirts the S. shore of the bay of Laborie. Point Laborie, its northern limit, is clear and its neighborhood affords anchorage for small vessels only.

A mile and a half off shore there is anchorage in 7 to 8 fathoms.

Hospital bay, between the point of the same name on the N. and point Laborie on the S., is clear, and anchorage may be had in the middle of the bay in 4 or 5 fathoms of water. Hospital bay.

Great and Little Nault bays lie between Boury point, on the N., and Hospital point, 2 miles to the southward. Great and Little Nault bays.

Boury point is a remarkable bluff, brown cliff, with a small rock near it, just awash, and should not be approached within 400 yards.

Little Nault bay is an unimportant cove. Great Nault bay affords good anchorage. The town of Nault, on its shore, is surrounded by high mountains, one of which terminates in a sharp peak. Not far from the S. end of the town there is a fort on a small rounded hill. This bay is entirely clear, and somewhat sheltered from northerly winds by Boury point. Soundings are regular and diminish from $7\frac{1}{2}$ to $1\frac{1}{2}$ fathoms as the shore is approached. A good berth for small vessels is with the church-tower on with the peaked mountain bearing about E. by N. $\frac{1}{2}$ N., in 5 fathoms water.

Good water is obtainable from the stream just S. of the village.

N. of Boury point, and between it and Baleine point, is Boury bay. Boury bay. There is anchorage here in 7 fathoms $\frac{1}{2}$ a mile S. of the Whale rocks, which lie $\frac{1}{2}$ a mile WNW. of Baleine point, and are a cluster of rocky heads just awash, rising from a white sand-bank with 4 fathoms of water on it. Whale rocks This rocky patch is about 1 cable in extent, and lies 7 miles S. by W. $\frac{3}{4}$ W. of cape Dame Marie. The sea breaks constantly on these rocks, so that they are easily avoided in the day-time. There is a clear $5\frac{1}{2}$ -fathom channel between them and the shore. The coast from Baleine point to cape Dame Marie runs about N. by E. for 7 miles.

Between Baleine point and Rousselin point, the southern limit of Dame Marie bay, are the three coves of Bayardelles, Bayardelles bays. the two southern of which are separated by a bluff rocky point just abreast of a rocky islet called Minister rock.

The coves or bays of Bayardelles are clear of danger. In the northern one there is anchorage in 6 to 8 fathoms of water, sandy bottom.

Cape Dame Marie is rather low, and on its extremity there is a small hill. Cape Marie. Dame One and a half miles W. of the cape

there are 15 to 17 fathoms of water, and 7 to 8 fathoms within 1 mile.

False cape, a short distance S. of cape Dame Marie, is sometimes mistaken for it. Between this point and point Rousselin is the bay of Dame Marie, $3\frac{1}{2}$ miles wide and 1 mile deep. It is entirely open to the westward. The bay is clear, and in entering it the only danger to be avoided is the reef which skirts the shore between cape Dame Marie and False cape at a distance of 300 yards.

The village of Petite-Rivière is on the NE. shore of the bay and the village of Dame Marie on the SE. shore. Half-way between them is a white bluff called the Twelve Apostles.

A convenient berth is with this bluff bearing ESE. in from 5 to 6 fathoms, $\frac{1}{2}$ a mile to 1 mile off shore.

Seringue point and bank of soundings. Seringue point is the NW. extreme of the long peninsula whose western shore we have been describing, and is a bold, prominent headland. Between this and cape Tiburon a sand-bank extends to the westward for 8 or 10 miles.

The edge is abrupt, and the depth under 20 fathoms, decreasing toward the coast. The water is very clear, and the sandy bottom may be everywhere seen.

Eastward of point Seringue there is a little cove only fit for boats.

From point Seringue the coast trends to the ENE. for 12 miles. Along this shore are several small coves, entirely open to the northward, and only fit for small vessels and boats.

Chaloupe bay. Chaloupe bay, 4 miles east of Seringue point, is the first of these.

Abricots bay. Abricots bay, $2\frac{1}{2}$ miles farther E., is the next. It has a small stream emptying into it, and is separated from Clerc bay to the eastward by a large bluff promontory.

Clerc bay. Two miles E. of Clerc bay is Trou Bon-bon; and 2 miles farther E. is cape Rosa, which is formed by steep bluffs.

Point Sal. Point Sal, a short distance W. of cape Rosa, is the most northern point of the peninsula.

Trou à Cochon. Trou à Cochon is an unimportant cove, from the eastern point of which a reef runs off a short distance.

Point Jeremie. From Trou-à-Cochon to point Jeremie, the coast for $1\frac{1}{2}$ miles is clear and bold. The latter point is long and narrow, and makes out to the eastward, with a reef which extends from it 2 cables farther to the eastward, which

somewhat shelters the anchorage off the town from northerly winds.

The bay of Jeremie is small and open. On its shore is the village of the same name. The edge of soundings is about $\frac{3}{4}$ of a mile off shore. On the bank in front of the town the depth is from 3 to 6 fathoms, but with a strong NE. breeze the sea breaks and the anchorage is unsafe.

Bay of Jeremie.

S. of the point, and outside of the reef which extends from it, is another reef called the Mouton, lying E. of the N. point of the village and $\frac{1}{3}$ of a mile off the beach. The anchorage, fit only for small coasters, is S. of the Mouton reef in 3 or 4 fathoms of water.

Mouton reef.

Between Jeremie and Caïmites bay, 10 miles to the eastward, the coast is clear and free of danger. It is generally low and covered with trees. Five miles eastward of Jeremie there are some white cliffs extending 4 miles E. and W.

Immediately E. of Jeremie point is Grande Anse, a bay, open to the northward, off which a vessel may anchor in from 4 to 7 fathoms 1 mile off shore.

Grande Anse.

The river Roseaux is the eastern limit of Grande Anse, and 4 miles E. of it is Patte Large point on the eastern end of the white cliffs just mentioned. This point is foul, and forms the western side of Trou Patte Large, a little bay, the mouth of which, $\frac{3}{8}$ of a mile wide, is so obstructed by reefs that only very small vessels can enter and find shelter. Temporary anchorage may be had $\frac{1}{3}$ of a mile N. of these reefs in 3 fathoms.

River Roseaux.

Patte Large point.

The bay of Caïmites is entirely sheltered on the N. and partially on the NE. by Caïmites island and the cays and reefs which extend from its western end to the shore of Santo Domingo. The entrance to the bay is between the eastern end of Caïmites island and Fantasque point, which will be recognized when nearly E. or W. of it by a low rocky point jutting out to the northward. This point bears S. from the eastern part of Great Cayemites.

Caïmites bay.

Half a mile to the westward of point Fantasque is the village of Au Bas; and to the westward of this, and close to the shore, a reef begins. This shoal runs nearly parallel with the shore, W. by S., for about $\frac{3}{4}$ of a mile, showing above water at low tide, but at high water exhibiting only a few black heads, which, however, serve to point out the

direction in which it lies. It then turns to the westward and WNW., its extremity bearing W. by S., $3\frac{1}{4}$ miles from point Fantasque. Here there are several heads with only 2 fathoms of water, but there are places where the reef can be crossed in 3 fathoms. Point Fantasque in line with the extreme point of Bec-à-Marsouin E. $\frac{1}{2}$ N. will clear the reef.

There is a chain of islands, covered with low mangrove-bushes, extending along the coast to the southward and westward of the village of Au Bas for a distance of $1\frac{1}{2}$ miles.

To the westward of this chain the shore is bold and the water deep close to the land.

Pestal.

Three miles to the westward is a small inlet, between high hills, and on this is the town of Pestal, a place of some importance. Very little of the town is visible from the water; only two or three houses on the beach, and a few more over the top of the hill.

Great Cayemites island.

Great Cayemites island is 5 miles long WNW. and ESE., $2\frac{1}{2}$ miles broad, 500 feet high, and thickly wooded; about $\frac{1}{2}$ a mile to the westward of it is Little Cayemites, a small islet $1\frac{1}{2}$ miles long and $\frac{3}{4}$ of a mile broad, with a channel 2 fathoms deep between. From the latter islet an extensive reef sweeps outward to the WSW. and connects itself to the shore about 15 miles to the westward of Fantasque point, completely sheltering the bay from the northward.

There is also a passage, with $1\frac{1}{4}$ to 2 fathoms water, running N. and S., for small vessels, westward of the Little Cayemites, over the white sand-bank between it and Great reef. The latter is covered with about a foot of water, and on it are several rocks or small cays. To the southwestward of Great reef there are two groups of cays covered with trees, which shelter the bay on the W. Near the coast of Santo Domingo there are various other cays and reefs.

Bec-à-Marsouin

The peninsula of Bec-à-Marsouin will be readily recognized by the deep bay back of it. From its eastern point the coast consists of perpendicular rocky cliffs, about 20 feet high, much worn and fissured by the action of the sea. A low table-land covered with dense foliage rises from the rocky cliffs, decreasing in height toward point Fantasque. Back from the coast the main-land is mountainous.

Three miles and a half to the westward of point Bec-à-Marsouin there is a shallow bay, at the bottom of which is

a short sand-beach, the only landing-place to the eastward of point Fantasque. It affords no protection to vessels. There is a small fishing-village near this sand-beach.

From this bay the coast is rocky, with occasional sand-patches, until near point Fantasque.

The first secure anchorage westward of Bec-à-Marsouin point is in 7 fathoms, with Fantasque point bearing E. by N. and the western end of the chain of islands extending from Au Bas, bearing S. by E. In this berth the reef, with only 2 or 3 fathoms water, is about a cable distant; do not shoal less than 5 fathoms, as the soundings are irregular.

Anchorage.

Large vessels may anchor in the bay close under the SW. side of Great Cayemites, or on the eastern side in Flamencos bay, off a sandy shore and in any convenient depth. Small vessels may anchor close in shore.

In entering Cayemites bay from the eastward, keep about 3 cables distant from the shore of the peninsula of Bec-à-Marsouin; no bottom at 20 fathoms will be found at that distance. As already mentioned, the channel between Great Cayemites and the reef extending off Au Bas is $\frac{3}{4}$ of a mile wide, and has from 3 to 5 fathoms. There is deep water within 3 cables of Fantasque point, and 10 fathoms at 1 mile W. of it. Do not haul in round the banks to the westward of Fantasque point before the W. end of Great Cayemites bears N., or the channel westward of it is well open; there is a patch with a depth of 3 fathoms southward of Little Cayemites.

Directions.

The entrance to Baradaïres bay, which is sheltered on its northern side by the peninsula of Bec-à-Marsouin, appears wide, but is obstructed by a reef extending from the southern shore. This reef extends, from some small cays near Picolet point, in a northwesterly direction to within $\frac{1}{2}$ a mile of Bec-à-Marsouin; it is steep-to and clear, with a channel for ships of the largest draught between it and the reef. A pilot is required, as the anchorage has many shoals.

Baradaïres bay

Between Gonave island and the coast we are describing is the Gonave channel, obstructed in its fairway by a dangerous rocky bank called the Rochelois, about 5 miles in length E. and W. and 3 miles wide. Some parts of the bank are uncovered, among others the Pirogues rocks, three of which cluster are always apparent; others, only at low water.

Rochelois bank.

Pirogues rocks.

NNW. of these rocks, at the distance of $\frac{1}{2}$ mile to 1 mile, there is a rocky patch with 10 feet of water on it, and another 3 cables NW. of the Pirogues rocks of the same depth. The bank is steep to and the soundings on it are irregular, varying from 4 to 7 fathoms. To avoid this dangerous bank in the night vessels should keep the shore on either side close aboard, observing that the coast of Gonave island must not be approached nearer than 1 mile, while the coast of Santo Domingo is perfectly clear and steep-to.

The Rochelois bank bears SSE. from the W. end of Gonave island and N. from the mountain of Miragoane, a remarkable peak 3 miles inland and 9 miles westward of the town of the same name. The northern edge of the bank is 9 miles from the nearest part of Gonave island, and its southern edge is 6 miles from the shore of Santo Domingo.

From Baradares bay to Miragoane, a distance of 23 miles, the coast is clear and steep-to and affords no shelter. Three and a half miles E. of the entrance of Baradares bay is the village of Petit Trou de Nippes. Thence the shore for $9\frac{1}{2}$ miles to the eastward is composed of perpendicular black cliffs as far as the village of Anse-à-Veau, and 6 miles farther E. is the village of Petite Rivière, with the stream of that name emptying into the sea between them.

Rochelois point is $4\frac{1}{2}$ miles E. of the town of Petite Rivière, and $3\frac{1}{4}$ miles W. of Frégate cay, or Black islet, a small cay on the reef at the W. end of Miragoane bay. The town of Rochelois is 4 miles inland, at the foot of the mountain of Miragoane.

The bay of Miragoane is $3\frac{1}{2}$ miles wide between the two points of entrance and $1\frac{1}{2}$ miles deep, but the apparent width of the entrance is diminished by a reef which runs directly across from the western side, leaving a deep channel 1 mile wide between its end and the eastern point. The reef is dry in places, and on its western extremity is Frégate cay, mentioned above. The anchorage is $\frac{3}{4}$ of a mile inside the point of the reef, in 10 to 12 fathoms, with the fort bearing about SE. by S. There is also a snug berth in the SW. part of the bay between two islets and the main-land, but it is very narrow. A spring of good water will be found in a cove $1\frac{1}{4}$ miles E. of Miragoane. In the cove there are $3\frac{1}{2}$

Petit Trou de Nippes.

Anse-à-Veau.

Petite Rivière.

Frégate cay.

Bay of Miragoane.

Anchorage.

and $4\frac{1}{2}$ fathoms of water, but a bar of 12 feet runs across its entrance.

Petit Goave bay lies 12 miles E. of Miragoane. Nearly midway between them there is a remarkable clear spot on the side of a mountain. The bay lies between point des Roches on the E. and point Antoine on the W. The latter point is the northern extreme of a peninsula on the W. side of the bay; its eastern extreme is called point Carénage. This peninsula shelters a little inlet having 3 to 7 fathoms of water.

The town is on the eastern side of the bay, and just abreast of it there is a small sandy islet, $1\frac{1}{2}$ cables off shore, called Anglais, or Poule. Half a mile WNW. of it is a rocky bank with 2 fathoms of water on it.

Between the Anglais islet and Carénage point the entrance of the bay is about 1 mile wide. It is sheltered from all but northerly winds; these are seldom strong, and Goave island partially shelters the bay in this direction.

There are three channels leading to the anchorage: the first, between the eastern coast and Anglais islet, is only suitable for boats or for small coasting-vessels. In it there are from 10 to 16 feet. The second channel is between Anglais islet and the rocky bank and is deep and clear. The third is between the rocky bank and the western shore. The anchorage is with the islet bearing N. or N. by E. in 6 or 8 fathoms of water.

Three small rivers empty into the bay, from any of which good water may be obtained.

Grand Goave bay is separated from the bay just described by a prominent rounded headland surmounted by a hill called Tapion du Petit Goave. It affords no shelter. The town is on the left bank of a small river emptying into the bay. A short distance to the eastward there is a wooded islet, with a 3-fathom channel 1 cable wide separating it from the main-land.

Between Grand Goave bay and Léogane point, $8\frac{1}{2}$ miles, the coast is low and wooded, and vessels may anchor off it in 7 or 8 fathoms of water.

The town of Léogane is on the banks of the river of that name, 1 mile from the mouth. Anchorage in 9 or 10 fathoms of water will be found abreast the mouth of the

river. This anchorage is entirely unsheltered. The bank of soundings is only $\frac{1}{2}$ a mile wide, and steep-to. It should therefore be very carefully approached.

Léogane shoal. A bank with from 6 to 13 fathoms of water on it lies NW. by N. 3 miles from Léogane point. As there may be less water on it, it had better be avoided.

Cadmus bank. About 7 miles N. from Grand Goave, with the E. end of Gonave island bearing N. by W. $\frac{1}{4}$ W. and the extreme of the land N. of Léogane E. $\frac{1}{4}$ N., is the Cadmus bank, extending $1\frac{1}{2}$ miles E. and W., with 10 fathoms of water on it.

From Léogane the coast trends to the NW. and W. $13\frac{1}{2}$ miles to point Lamentin, the western limit of the bay of Port-au-Prince. The shore between the latter point and Léogane point is almost everywhere skirted by a reef extending $\frac{1}{4}$ of a mile off shore.

Small coasters find berths for anchoring inside of this reef, but we can give no directions for them.

Gonave island. Gonave island lies immediately abreast of the deep bight called the gulf of Port-au-Prince, and forms two channels leading toward the city of that name. The one between the N. side of Gonave and St. Mark's point is called St. Mark's channel, and that lying S. of Gonave island is called the Gonave channel. The island is 32 miles long ESE. and WNW., and 7 or 8 miles broad.

At a distance from a NW. direction two round hills are seen. The highest, called the Table, is in the SE. part of the island and has an elevation of 2,500 feet.

The W. coast is low and steep-to, there being 15 to 18 fathoms of water at 1 cable's length off shore.

Gonave bank. The SE. part of the island is connected with Santo Domingo by a bank of coral, rocks, and mud, with varying depths of from 6 to 75 fathoms. The bank is steep-to, and from the SE. point of the island its edge takes a northeasterly direction, and passing about 2 miles N. of the Arcadins cays joins the shore of Santo Domingo. The SW. edge of the bank runs from the southern shore of Gonave island in a direct line to Léogane point. The N. point of the island is called point Lataniers, and from it a reef skirts the N. and NE. coasts of the island, except from Mark islet to Galet point, where the shore is clear. This reef is about 1 cable length off shore, except from Buen

North and
northeast coasts.

Hombre point to Mark islet, where it is from $\frac{1}{2}$ to $\frac{3}{4}$ of a mile off, with anchorage for small vessels inside of it. These anchorages are approached through cuts with a depth of 9 or 10 feet of water in them. The best of these openings will be found in front of the fishermen's huts, and the best anchorages with 4 or 5 fathoms of water off the bays Galet, Trou Constantin, or Piron, just inside the edge of the reef and about 80 fathoms off shore. Reef anchor-
ages.

This reef continues from Galet point to Grosse point, the eastern extreme of the island, in some places extending 1 mile off shore.

From Grosse point to Fantasque point, the SE. extreme of the island, the coast is bold and clear and forms Grande bay. Southeast coast.

Fantasque point is a very conspicuous white bluff, and the land forms a small peninsula.

Not far to the eastward of the bluff is a small islet called Petite Gonave, which is foul on its N. side to the distance of $\frac{1}{2}$ a mile. To the ESE. of the islet there is also an extensive bank, which runs off from it 3 miles, with $3\frac{1}{2}$ to 11 fathoms water on it, and on it are two small cays called Sable and Frégate-le-Croissant. There is a channel with about 3 fathoms water between the cays and Petite Gonave, and also between the latter and Fantasque point; but the current is so strong and variable that it would be dangerous to attempt either without a leading wind. Petite Gonave
island.

Small vessels will find an anchorage under the W. end of Petite Gonave, which had better be entered from the southward. The only spot where vessels of large draught can anchor safely is in Anse du Parc, on the W. side of the peninsula, between Fantasque and Sable points; its entrance, however, is so beset with dangerous rocky shoals, not easily seen, that it requires the assistance of a pilot. Anchorage.

From Sable point to Retours point, about 12 miles westward, the coast of Gonave is bold and steep-to, but from the latter to the SW. end of the island it is skirted by detached reefs, and becomes dangerous. Small vessels, however, with the help of a pilot, will find their way through to the anchorage in the bay of Mahotièrre or that of Baleines. Here there are from 15 to 18 fathoms on the edge of the reefs, which extend from $\frac{3}{4}$ to $1\frac{3}{4}$ miles from the shore. A Southwest
coast.

remarkable white spot may be observed about 13 miles from the W. end of the island.

Water. Good water may be obtained about 5 miles eastward of the NW. point of Gonave.

Bay of Port-au-Prince. The bay of Port-au-Prince lies between Lamentin point on the S. and Cul-de-Sac point on the N., both low and wooded.

Light. There is a light-house tower on Lamentin point, 50 feet high, but there is no longer a light shown from it.

City of Port-au-Prince. The city of Port-au-Prince, situated at the head of the bay of the same name, is the capital of Hayti, the western division of the island of Santo Domingo. It lies on the northern slope of a spur of the great mountain-chain that runs through the island from E. to W. Its population is about 22,000. It is a place of considerable, although decreasing, commercial importance. It is regularly laid out, but most of the houses are of wood and the streets are unpaved. The town is nearly surrounded by marshes, and is very unclean and unhealthy, especially during the summer months. Behind the city is fort Alexander, on elevated ground; 2 miles to the westward is fort Bizothon, a low square building close to the shore.

Inner harbor. In the northern part of the harbor there is a small but well-sheltered basin, called the Inner harbor, large enough to hold a few vessels moored head and stern, and having a depth of 4 fathoms. On the northern side of this basin is a small cay called Fort islet, on which is a water-battery.

There are other fortifications along shore all more or less in ruins.

In the northern part of the bay, as well as abreast of the town of Port-au-Prince, there are numerous cays, rocks, and reefs, sheltering the anchorage on the N. and north-western sides.

Pelican cays. Some of these cays are barren and others wooded; the outside cluster have the general name of Pelican cays, and consist of five small sandy and mangrove cays, occupying a space of $\frac{3}{4}$ of a mile in a NW. and SE. direction. On their N. side they may be approached within $\frac{1}{2}$ a mile. They lie NW. 5 miles from fort Alexander and $3\frac{1}{2}$ miles NNE. $\frac{3}{4}$ E. from Lamentin point. To the southward and SW. of these cays, and extending over a distance of 2 miles, are several rocks and dangerous reefs, among which are the Ambis rocks,

four in number, and just above the water, the Folleurs, Blanc, and Bellevue rocks, and the Bellevue bank.

Southeast of the Pelican cays are the Magdalen banks and the Trois-Maries rocks, extending to within $\frac{3}{4}$ of a mile of the eastern shore.

Sand Cay shoal, nearly or quite awash, lies $1\frac{1}{2}$ miles S. of the Pelican cays, and has an extent of $\frac{1}{2}$ a mile N. and S.

Sand cay shoal.

The Inginac shoals are two nearly dry rocky banks lying about 1 mile SE. of Sand Cay shoal. They are nearly 1 mile in extent N. and S., and are nearly connected to the small cays on the N. side of the inner harbor.

Inginac shoals.

In clear weather both these shoals and the Sand Cay shoal can be seen

Vessels coming from the NW. through St. Mark's channel may, after making St. Mark's point, steer to pass either between the Arcadins and the shore of Santo Domingo or between Gonave island and the Arcadins. The former leads more to windward, but for a stranger, at night, the latter is preferable. If the inside passage is taken the Arcadins should be passed at the distance of 1 mile, and the course continued S. till the vessel is to the southward of the 3-fathom shoal, lying 2 miles from the main.

The channel for large vessels into Port-au-Prince harbor lies close along the southern shore, E. of Lamentin point. The soundings vary from 4 to 20 fathoms, and the southern shore is skirted by a rocky ledge to the distance of $1\frac{1}{2}$ cables.

In passing to the westward of the Arcadins, Prince's peak, a mountain 5,000 feet high, 8 miles to the southward of the city, is a good mark; kept on a SE. $\frac{1}{2}$ E. bearing it will lead clear of them and up to Lamentin point.

Prince's peak.

When fort Alexander opens to the southward of Fort islet a vessel will be to the southward of the Pelican reefs, and may then haul to the eastward for the roads.

The best anchorage in the roads will be found with fort Alexander E. $\frac{3}{4}$ S. and fort Bizothon SW. by S. In the centre of the roads there is a small 4-fathom patch, lying with fort Bizothon S. by W. $\frac{3}{4}$ W. and Fort islet about E. by N.

Shoal.

A fixed *red* light is exhibited from a lantern hoisted on a coal-hulk in the northern part of the harbor, lying $\frac{3}{4}$ of a

Light.

cable westward of Fort islet.* It can probably be seen 9 or 10 miles; but should not be depended upon.

Tides. It is high water, full and change, at Port-au-Prince about 8^h. The tide rises and falls about 1 foot, but is much influenced by the wind.†

Land and sea breezes. The sea-breeze in the outside channel generally blows from WNW., commencing in settled weather about 11 a. m. and continuing till 7 p. m. The land-wind frequently comes off with a furious squall. These gusts come down frequently off the high land with great violence, and in hurricane months reach half-way across the channel between Santo Domingo, Cuba, and Jamaica. They frequently give but little warning, and the navigator should therefore be constantly on his guard.

In the harbor of Port-au-Prince the easterly breeze generally commences at daybreak, and after 12 o'clock changes to the westward. This change takes place at 1 or 2 p. m., and is frequently accompanied by a heavy squall.

In the spring and summer months it generally rains between 6 and 9 o'clock p. m. The direction of the land-wind varies with the trend of the coast.

Supplies. Coal and fresh provisions may be had at Port-au-Prince, but there are no facilities for repairs to vessels or steam-machinery.

N. of the city of Port-au-Prince is an extensive low plain, surrounded by mountains, called the Cul-de-Sac. Abreast the northern part of this plain is the road of Foso or Marais, affording good anchorage in from 6½ to 18 fathoms of water, muddy bottom. Six miles N. of Marais road is Carnero cay, lying so close in shore as to be with difficulty distinguished.

Village of Boucassin. WNW. from Carnero cay is the village of Boucassin; S. of it, ¼ of a mile off shore, a vessel may anchor in 8½ fathoms of water.

Arcahais. The village of Arcahais lies 5 miles NW. of Boucassin; abreast of it there is anchorage, ½ a mile off shore, in 15 fathoms of water.

Arcadins. The Arcadins are three small, low, bushy islets, extend-

* This has probably been discontinued.

† In March, 1875, H. M. S. Woodlark found a rise of 3 feet at Port-au-Prince.

ing about 1 mile in a N. and S. direction; the nearest is about $3\frac{1}{2}$ miles from the shore. They may be approached with safety on all sides; on the E. they are bold and steep-to, with from 20 to 6 fathoms of water between them and the main, but the soundings are variable; near them the bottom is hard, but as the shore is approached it becomes soft and muddy. A coral bank extends NNW. about 1 cable from the smallest islet. At the distance of 3 miles E. $\frac{1}{2}$ S. from the southern islet, and about 2 miles from the coast, there is a shallow bank with 3 fathoms water on it. Between it and the islets there are from 6 to 18 fathoms, and between it and the shore 7 and 14 fathoms.

The best anchorage will be found in 11 or 12 fathoms water, with the smallest islet bearing SW. by W., distant about 1 mile. Vessels bound to Port-au-Prince would find this a good place to anchor for the night, if near it at sunset, with a land-wind.

From the village of Arcachais to Montrou point the coast takes a NW. direction and is steep-to and clear, with the exception of the shoal just described near the Arcadins.

Under Montrou point small coasters find shelter in 5 fathoms of water from north and northwesterly winds.

From Montrou point to St. Mark's point the coast is low and bushy and steep-to all the way. Between these two points it forms a curve about 8 miles long and 1 mile deep.

St. Mark's point, limiting the bay of the same name, on the S., is a prominent round headland, 3 miles wide. To the eastward, 31 miles inland, is a mountain, called the Devil's peak, 5,100 feet high, bearing E. by S. from the town, and forming an excellent landmark for the bay of St. Mark's.

St. Mark's bay
and point.

Morne Diable point, the northern point of the bay, is a flat table-land covered with wood and ending in a steep, rocky cliff, 50 feet high. The two points bear from each other S. $\frac{3}{4}$ W. and N. $\frac{3}{4}$ E., 10 miles apart, and from this line the bay is about 5 miles deep. The shores of the bay are very steep, with from 13 to 19 fathoms of water 2 or 3 cables off shore. From a short distance SE. of Morne Diable point a reef borders the northern shore, about 2 cables distant, as far as the Guepes river; just N. of the town the S. shore is also foul in spots. Temporary anchorage may

be had off the N. or S. end of the town in 18 fathoms of water, about 200 yards off shore.

Bay and river
of Artibonite.

To the northward of Morne Diabie point the coast is low, with high mountains inland. The bay of Artibonite, into which the river of the same name empties, is very small, and lies immediately N. of the Morne Diabie point.

The entrance of this river is nearly dry at low water and is seldom visited. At high water boats can proceed 5 or 6 miles above the mouth. Water may be obtained, but no wood. To anchor off Artibonite river, bring Morne Diabie point to bear S., distant about 3 miles, when a few houses will be seen close to the shore. These houses should be brought to bear ESE., and should be approached on that bearing within 2 miles, when a detached bank will be struck, with a depth of water of from 6 to 20 fathoms. The lead must be kept carefully going, as within the bank there is no bottom till within $\frac{1}{2}$ a mile of the shore, when suddenly a depth of 5 fathoms will be found. A vessel anchoring here must be ready to come to at a moment's notice.

On the S. side of the entrance to the river there is a remarkable small cavern.

Point Salomon.

Point Salomon lies 3 miles N. of the Artibonite river, and forms the S. point of Grand Pierre bay, where in case of necessity temporary anchorage may be had close to the shore in 3 or $3\frac{1}{2}$ fathoms of water.

Halle point.

Halle point lies between Grand Pierre bay on the S. and

Tortuga bay.

Tortuga or Tortue bay on the N., and from it a sand-bank with a depth of $\frac{1}{2}$ to $2\frac{1}{4}$ fathoms of water on it extends more than 1 mile off shore.*

Tortuga bay is lined by a continuation of this sand-bank, which, skirting the peninsula or island to the northward at the distance of $\frac{1}{2}$ a mile from the shore, extends to Verreur point, where it reaches off shore a distance of 2 cables. The entrance of Tortuga bay is also obstructed by some dangerous coral heads lying $1\frac{1}{2}$ miles N. by W. from Halle point, and having $1\frac{3}{4}$ to $2\frac{3}{4}$ fathoms of water on them.

* This bank is said to extend $1\frac{1}{2}$ miles farther out than is shown by the chart. With Verreur point bearing NE. $\frac{1}{2}$ E., and Halle point E. $\frac{1}{4}$ N. there are $4\frac{1}{2}$ fathoms of water.—*Nar. Sub. Lieut. J. R. H. Macfarlane, R. N.; H. M. S. Mullet.*

All this shore from Gonaïves bay to Morne Diable point must be approached with caution.

Verreur point is the northern end of a small island separated from the main-land by a channel only navigable for canoes at high water.

Verreur point.

This island forms the W. side of Gonaïves bay, which, although open to the westward, affords excellent anchorage, especially for vessels not drawing more than 16 feet of water, as they can enter Hospital bay or Inner harbor on the S., where they can lie perfectly sheltered in $3\frac{1}{2}$ fathoms of water.

Gonaïves bay.

The entrance to Gonaïves bay between Verreur point on the S. and the nearest part of the northern shore is nearly 1 mile wide, and is only obstructed by the sand-bank which extends off it the distance of 2 cables, and can in clear weather be seen and easily avoided.

The entrance is not at first readily distinguished. The land N. of the bay is high, while to the southward a low, level plain extends for 14 miles, as far as the river Artibonite.

Pierre head, on the N. side of the indentation which forms Gonaïves bay, is a bold rocky headland, above which is a hill of the same name. At $\frac{1}{3}$ of a mile SW. by S. from the point there is a shoal with only $2\frac{1}{2}$ fathoms of water on it, and S. by W. nearly 1 mile from the same point is another shoal with $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms on it. Both these shoals are of small extent; between them there is a clear channel with depths of 14 or 15 fathoms. In coming from the westward a cluster of trees, among which are two large fig-trees, called the Bois de Bayahondes, to the eastward of the town of Gonaïves, on with point Blanche de Gonaïves, or Fours-de-Chaux, a white-faced bluff, bearing E. $\frac{1}{4}$ S., will lead between these two banks. As soon as Pierre head bears N. steer ESE. to avoid the reefs which extend $1\frac{1}{2}$ cables from Point Verte de Gonaïves, the N. point of the bay. For a stranger a better course is to the southward of the shoals. For this channel bring fort Castries, standing on a small hill on the N. side of the bay, on with a remarkable vertical notch in a mountain called Biénac, N. of the town.

Pierre head.

Shoal.

This mark will lead to the southward of the shoals, and within $\frac{1}{2}$ a mile of Point Blanche de Gonaïves; thence keep

Anchorage. in mid-channel as the town is approached. A good berth for large vessels is with fort Castries bearing N. and the centre of the town E. by N., in 7 fathoms of water, bottom mud, sand, and coral.

The point Verde de Gonaïves, or Petit Boucan, situated 1 mile E. of Pierre head, is low and covered with mangroves. From it a coral ledge, steep-to, with 10 feet of water on it, extends $1\frac{1}{2}$ cables.

To the eastward of this point the land begins to rise, forming the white-faced bluffs of Point Blanche, or Fours-de-Chaux; still further E. is point Lefevre, the western limit of the inlet of the same name, open to the SW. The eastern point of this inlet is called Castries point; the fort on it and hill behind it have the same name. South of the point, $1\frac{1}{2}$ cables distant, there is a coral head called Castries rock, with 7 feet of water on it. N. of this danger there are $2\frac{1}{2}$ and S. of it $5\frac{1}{2}$ fathoms of water.

The line from point Castries to point Verreur separates the inner from the outer road of Gonaïves.

Town of Gonaïves.

The town of Gonaïves is near the shore on the E. side of the bay. The landing is abreast the middle of the town and just N. of a small battery. S. of the town are large salt-works, extending as far as Ligero point, bounding, to the eastward, Hospital bay, the western limit of which is Verreur point. These two points are low and covered with mangrove-trees. The bank which lines the N. and E. shores of the bay of Gonaïves obstructs the entrance of Hospital bay, with several coral heads nearly awash, narrowing it from an apparent width of 1 mile to $3\frac{1}{2}$ cables. In approaching Gonaïves bay from the southward it is prudent to keep well off shore, outside of a line drawn from point St. Mark to point Morne au Diable. As soon as the perpendicular bluff of mount Biénac, to the northward of the town, bears NE., by E. this latter course will lead directly into the outer roads.

A vessel working into Gonaïves bay should not stand farther to the southward than to keep the notch in the hill open to the northward of mount Châtelain, or Châtenay, a large high mountain near mount Biénac. In leaving the bay keep the notch open till St. Mark point opens out west-

ward of Morne Diable point, which, from this position, will appear like an island.

It will be prudent for a sailing-vessel to enter the bay with the sea-breeze, and to wait for the land-breeze for leaving it.

The sea-breeze sets in from the NW. toward noon and continues till 10 p. m., when the land breeze commences and blows about E. by S. till 6 a. m. Sea and land breezes.

It is high water, full and change, at Gonaïves at 8^h 0^m. Tides.
The tide rises and falls about 1 foot.

From Pierre head the coast trends NW. $\frac{1}{2}$ W. 9 miles to a bold rocky point called Corridon. Between these two points an extensive bank of soundings makes off 4 or 5 miles, on which a vessel may anchor in 17 fathoms of water, with Pierre head bearing E. and Corridon point NW. $\frac{1}{2}$ N. Corridon point.

During the rainy season, from June to September, the weather in the evening on this part of the coast is very squally and uncertain, and vessels should therefore keep, if possible, 6 to 9 miles off.

From Corridon point the coast trends about NW. by W. $\frac{1}{4}$ W. 7 miles to port Piment, a little bay 2 cables wide at its entrance, $\frac{1}{2}$ a mile deep, and open to the southward, with depths of from $4\frac{1}{2}$ to 6 fathoms of water. Back of the bay on the low land there is a remarkable mound. Port Piment.

Paradis point lies W. $\frac{1}{2}$ N. $7\frac{1}{2}$ miles from port Piment. On its eastern side there is a small bay open to the SE. All this coast as far as the Platform is bold and steep-to. Paradis point.

Héne bay is $5\frac{1}{2}$ miles to the eastward of Paradis point, and lies between Héne point on the W. and point Boucan on the E. It is open to the S. On its western side there is a mountain 1,700 feet high. Between the two points of entrance there are 24 fathoms of water; inside, the soundings are irregular. It is not a good anchorage, but if obliged to anchor here the best place will be found on the eastern side of the bay, where the soundings are least irregular, in about 15 fathoms of water. Héne bay.

E. of Héne point, at a distance of 2 miles, there is a remarkable white bluff, from which to the Platform the coast takes a westerly direction for 7 miles.

Platform point is a white rocky bluff, with a flat top. Three miles NW. of it there is a similar bluff called the Platform point, bay, and village.

Lower White Horses. Lower White Horses. W. of Platform point is the little village and bay of the same name, affording anchorage in from $2\frac{1}{2}$ to $3\frac{3}{4}$ fathoms of water, abreast of the mouth of a small stream emptying into the bay. From the Platform the coast trends to the NW., for 10 miles, to Pearl point, close to the westward of which a vessel may anchor in from $7\frac{1}{2}$ to 9 fathoms, very near the shore, where there are a few houses on the beach. To anchor here bring the mouth of the little brook to bear NNE. and anchor as soon as the southernmost point bears E. by S. The edge of the bank of soundings is foul and only 2 cables wide.

Between Pearl point and cape Locos, or Cap-à-Foux, the coast is formed by bold cliffs, steep-to. There is a range of mountains, 3 miles inland, 2,000 feet high, under which vessels are frequently becalmed. In shore the current sets to the northward, but 6 miles off shore it generally sets to the W. and WSW.

Cape Locos. Near the extremity of cape Locos there is a rock resembling an islet, and a short distance to the southward a remarkable white cliff, called the Upper White Horses.

From cape Locos to cape St. Nicolas the coast runs NE. $4\frac{1}{2}$ miles.

Upper White Horses. St. Nicolas, bay or mole. St. Nicolas bay or mole, at the head of which is the little village of the same name, is at the NW. extreme of Santo Domingo. Its northern side is formed by a low flat peninsula joined to the main-land by a narrow isthmus. From the flat surface of this peninsula the bay has received the name of St. Nicolas mole. The entrance is $1\frac{1}{2}$ miles broad, and the bay to the mouth of the Carénage is $2\frac{1}{4}$ miles deep. In the outer part of the bay the water is so deep and the shore so bold that there is no safe anchorage.

From the sandy point on which the town is situated, the shores on both sides turn to the NNE., for $1\frac{3}{4}$ miles, forming the inner part or Carénage, with a depth of from 6 to 16 fathoms. It is close and confined, however, and in the rainy season would probably be an unhealthy place. A sailing-vessel would have to work in to St. Nicolas anchorage. In doing so it will be well not to stand very near the southern shore, as the sea-breeze generally blows fresh from NE. by N., and it being flawy she might miss stays.

A good temporary anchorage is in 7 to 10 fathoms of water, about 2 cables from the northern shore, with fort St. George in front of the town, bearing about SSE., and the magazine to the NE. of the town E. $\frac{3}{4}$ S. Keeping the town shore aboard, a safe berth may be taken farther in, with fort St. George bearing SW. and the magazine NE. by E.

Anchorage.

If it is desired to enter the Carénage it will be best to wait till the sea-breeze lulls, and then warp or tow in; in the winter this will not be till 8 p. m.

The land-wind generally blows moderately from the SE. till about 6 a. m. There is then a calm for about two hours, when the trade-wind sets in as a sea-breeze from NE. by E., backing to NE. by N. and blowing fresh till evening, and sometimes as late as 10 or 11 p. m.

Winds.

Water may be obtained at night from a brook used by washerwomen in the day-time, and emptying into the bay E. of fort St. George.

Water.

No dependence can be placed upon procuring fresh provisions here.

The description of the northern coast will now be taken up at cape Samaná and described from windward to leeward.

Between cape Samaná (page 273) and cape Cabron, $4\frac{1}{2}$ miles to the NW., the coast forms a deep bight, in which are several cays and reefs close to the shore. Cape Cabron terminates in a white perpendicular cliff, higher than cape Samaná. Between these two points the coast should not be approached nearer than 3 miles. SW. by W. from cape Cabron, at a distance of 5 miles, is a mountain, 1,936 feet high, called Mt. Cabron, or el Pilon de Azucar.

Cape Cabron.

From cape Cabron to point Jackson the coast takes a WSW. course for 23 miles, and then turns sharply to the northward to cape Viejo Frances, forming an extensive bight called Escocesa bay. The western coast affords no shelter and is uninhabited; on the southern shore there are some small anchorages, where in fine weather coasters may load mahogany. These are—proceeding from cape Samaná to the westward—ports Galeras, Rincon, Escondido, San Juan, l'Hermitano, (near the cay of the same name,) port Limon, Pechem's point, the mouths of the Estillero and Lateriana rivers, ports Moretes and Jackson.

Escocesa bay.

Ports in Escocesa bay.

Port Jackson This latter port affords tolerable anchorage for vessels of moderate size, being somewhat sheltered by the cay and reef of the same name. The entrance is open to the NE., and is said to be clear of danger except a shoal in mid-channel, easily seen and having deep water on both sides. There are some large cays or rocks 4 miles E. of the entrance, and still farther to the eastward are some others. The entrance to the harbor is said to be abreast of a remarkable white rock.

Grande Estero. A short distance W. of port Jackson is the Estero Colorado, which formerly communicated with the bay of Samaná. This channel is now entirely closed up.

The entrance to the Grande Estero affords anchorage, moderately well sheltered, with depths of from $5\frac{1}{2}$ to 11 fathoms.

Port Matanzas. The port of Matanzas lies 2 miles farther to the westward; it is easily entered, but only fit for small vessels.

Cape Viejo Frances. Cape Viejo Frances is steep and high, and can be seen from a distance of 30 miles. There is a high mountain lying 12 miles SW. by S. from it, visible 45 miles off. At the foot of the bluff of the cape there are some rocks and foul ground.

Between cape Viejo Frances and cape La Roca the coast trends about W. $\frac{1}{2}$ S. 9 miles, is bold, steep, and thickly wooded; it should not be approached nearer than 3 miles on account of the off-lying reefs and shoals. W. of cape Roca the coast forms a bay, about 6 miles wide, skirted by a reef.

Point Macoris. Point Macoris, 18 miles WNW. of cape La Roca, is high and steep-to. Between these two points are the small ports of Soufrière, Ananas, Grosse pointe, and Macaris. Port Soufrière affords anchorage for vessels of considerable size. The western channel is the better one of the two cuts through the reef which shelters the anchorage. The other so-called ports are only boat-harbors.

Ports Sou-
frière, Ananas,
Grosse pointe,
and Macaris.

Port Cabaret. Port Cabaret or Santiago is but seldom visited. It lies a short distance W. of point Macoris, and is about 1 mile wide at the entrance, formed by Cabaret point on the E. and Galeta point on the W. side. From the latter point a dangerous reef stretches off in a SE. direction toward Galeta point. Outside this reef, to the northward, is a sand-bank with $2\frac{1}{2}$ fathoms of water on it, and also a rocky bank with $1\frac{1}{4}$ fathoms.

The passage W. of these dangers, and between them and the reef, is about 60 yards wide, with depths of $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms.

Vessels of 400 tons visit this port, anchoring in 4 to 5 fathoms of water within 1 or 2 cables of the shore. The holding-ground is not good. Before entering, it will be well to buoy the points of the reefs.

The tide rises and falls $3\frac{1}{2}$ feet at port Cabaret.

The river Yasica empties into the sea $3\frac{1}{2}$ miles SW. by W. from port Cabaret. There is absolutely no shelter here, and no vessel can anchor with safety.

River Yasica.

The mahogany cut in this vicinity is taken by land to port Cabaret and shipped from there.

There are 3 small ports between point Cabaret and port de Plata called Sosua, Brigantin, and Padrepino, but no instructions can be given for them, and they are rarely visited. The coast between these two points is very foul, and should not be approached nearer than 3 miles.

Ports Sosua,
Brigantin, and
Padrepino.

Port de Plata is the only port of entry in this part of the island. It lies 51 miles W. of cape Viejo Frances and $10\frac{1}{2}$ miles from port Cabaret.

Port de Plata.

Its locality is easily recognized by a high isolated mountain, $2\frac{1}{2}$ miles inland, called Isabelle de Torres, 2,300 feet high, and having a conspicuous white spot on it. Westward of the mountain, at a distance of 4 or 5 miles, are some small conical hills. The harbor is semicircular in form, with a low sandy beach, and affords good anchorage. On the eastern point there is a hill with a fort on it, near which, to the southward, is the town. Both points of entrance are skirted by reefs to the distance of $\frac{1}{4}$ to $\frac{1}{2}$ mile, leaving a channel between them about 250 yards wide. There is a red buoy planted to mark the fair-way. The wider part of the channel lies W. of this buoy, which is placed in $9\frac{3}{4}$ fathoms, with the eastern shoulder of mount Isabella de Torres on with the eastern point of the bay, and the rock outside the western reef NW. by N.

Buoy.

To enter the port, being 2 or 3 miles off shore, bring the western part of the flat summit of Isabella de Torres to bear SSW. and steer for it. On this bearing it will be in line with the extreme of the eastern point of the entrance. As soon as a small rock, which will be seen just outside the

western reef, $\frac{2}{3}$ of a mile northward from the western point of entrance, is brought to bear NW., the course must be changed to SW. $\frac{1}{2}$ S. to pass between the points of the reefs, which can be easily seen.

Anchorage. In the channel the soundings are regular, but between the points of entrance they diminish rapidly, and a vessel should therefore be prepared to anchor immediately under the eastern point, in about 5 fathoms of water. At $\frac{1}{4}$ of a mile from the head of the harbor there are only 2 fathoms of water.*

Water. Two small streams empty into the harbor, and in the rainy season large quantities of water flow from them. At that time the river of St. Mark, in the western part of the harbor, is the best watering-place. In the dry season the eastern stream is the most convenient.

Tides. At full and change it is high water at Port de Plata at 7^h 30^m. The tide rises and falls about 3 feet, but there is no perceptible stream. Outside the harbor the current generally sets to the westward, inclining toward the shore.

Land and sea breezes. The sea-breeze at Port de Plata in the winter sets in strong from ENE. about 9 a. m. and continues till sunset, when a light land-breeze comes off from about SE.

This harbor is exposed to the N., but winds from that quarter seldom blow.

Algarroba point. The reef which skirts the western point of Port de Plata extends along the coast for several miles toward Algarroba point, 6 miles to the westward. There is no anchorage along this part of the coast except for very small vessels, which find shelter among the reefs. Algarroba point is high and bold and readily distinguished.†

Cape Isabelle. From here the coast trends NW. by W. $13\frac{1}{2}$ miles to cape Isabelle, also called Isabelica. When off point Algarroba cape Isabelle appears like a low wooded island, with some palm-trees on its northern end.

* Lieut. E. J. Strong, navigating officer of the U. S. S. *Seminole*, July, 1869, states that instead of a depth of $4\frac{1}{2}$ to 6 fathoms at the entrance, as shown by surveys of Commander Owen, R. N., in 1830, there are but 3 fathoms, and the pilot states that at low water there are but 15 feet of water on the bar.

† U. S. Hydrographic Notice, No. 16, of 1868 states that a shoal extends off 4 cables to the northward from point Patilla, lying in lat. $19^{\circ} 56' N.$, long. $70^{\circ} 47' W.$ This is either point Algarroba or very near it.

A short distance to the eastward is Port Caballos, said to be a better and more sheltered anchorage than Port de Plata, with, however, but 10 feet of water in the entrance. This place was named Puerto de Gracia by Columbus, who visited it in 1493. Near Port Caballos is an anchorage called Azufre, 6 miles W. of Algarroba point.

Port Caballos.

Azufre.

East of and very near to cape Isabella coasters of 10-foot draught find shelter under the reefs.

To the westward of the same cape is Isabella bay, open to the N. and NW., but affording good anchorage and easy of access. A good berth will be found with a bottom of mud and sand in $4\frac{1}{2}$ fathoms of water, with the N. point bearing NE. about $1\frac{1}{2}$ miles distant.

Isabella bay.

Small vessels may anchor closer in shore, but the depths are irregular, with a reef and several sunken rocks in the way.

Fresh provisions, wood, and water may be procured here.

It was at this point that Columbus first established a colony in the West Indies. Nothing remains to mark the spot but the ruins of a single pillar concealed by the bushes near the beach. From cape Isabelle to point de la Grange, 30 miles to the westward, the coast is everywhere skirted by reefs extending 3 miles off shore. This part of the coast is uninhabited, little known, and had better be avoided. There are, however, one or two anchorages available in case of emergency.

The best, probably, is immediately W. of Rucia point, lying 7 miles W. of Isabella bay. Here a vessel may anchor in 12 fathoms of water, sheltered by Rucia point and the reef off it, as far round as NNW.

Rucia point

There is also said to be anchorage, with a depth of 5 or 6 fathoms of water, under Arenas cay, 3 miles westward of Rucia point and $1\frac{1}{2}$ miles off shore. No definite instructions can, however, be given, and this dangerous vicinity had better be avoided.

Arenas cay

Point de la Grange is a bold headland about 1 mile long, forming the eastern limit of Monte Christi bay. It is easily recognized by a remarkable hill, 800 feet high, near the shore, having a flat summit shaped somewhat like the roof of a barn.

Point de la
Grange.

Jicaquito bay. E. of point de la Grange is Jicaquito bay, 2 miles wide and $1\frac{1}{2}$ miles deep, affording good anchorage in $4\frac{1}{2}$ fathoms, and sheltered by a reef extending from Fregáta point, its eastern limit. The sea always breaks on this reef.

A large marsh lies between point de la Grange and the town of Monte Christi, and through it there is said to be a channel, connecting the bays of Monte Christi and Jicaquito, with a depth of 2 to 4 fathoms, and a rise of tide of 3 feet.

Monte Christi
bank.

An extensive bank of soundings, called Monte Christi bank, extends from cape Isabella to the westward as far as 12 miles NW. of point de la Grange, then sweeping to the SW. for about 4 miles, it joins the shore again at Manzanillo point. It has never been thoroughly surveyed, and urgently needs examination. Within its limits are several islets, rocks, and shoals; until a more complete examination has been made, great caution must be used in passing over or near it. On this bank the water is discolored, the depth uneven, and the nature of the bottom very variable, being generally coral or coarse sand near the edge, and mud nearer the shore.

Grange shoals.

The Grange shoals, or Haut-fonds, are two small patches near the edge of the bank. Together they take up an extent NW. and SE. of 3 miles, and are situated $6\frac{1}{2}$ or 7 miles from Grange point, bearing from it between N. by E. $\frac{1}{4}$ E., and NE. by N. $\frac{1}{4}$ N. The inner one is said to have 23 feet of water on it and from 12 to 25 fathoms all around. The outer one, about 1 mile to the NNW., is said to have 6 fathoms on it. From this patch the two small cays, Fraile and Cabra, near Grange point, will be open of each other clear of the point, the westernmost islet bearing SSW. $\frac{1}{2}$ W.

Liverpool and
Phaeton shoals.

Phaeton and Liverpool shoals, on which H. M. S. *Liverpool* grounded in 1864, lie in a line NW. $\frac{3}{4}$ N. from Fraile islet, which is 30 yards NW. of Grange point. Phaeton shoal is a little over 2 miles from Fraile islet, is 300 yards long E. and W. and 200 yards wide, with a depth of $3\frac{1}{4}$ fathoms over it. Liverpool shoal, $\frac{2}{3}$ of a mile NW. $\frac{3}{4}$ N. from Phaeton shoal, is 700 yards long ENE. and WSW., 200 yards wide, with from $2\frac{1}{2}$ to 4 fathoms of water on it. About 125 yards N. of the eastern end of Liverpool shoal is a much smaller shoal, with 5 fathoms of water on it and 10 fathoms all around.*

* Commander A. V. Reed, U. S. N.

One-half a mile farther on in the same direction, between and near these shoals, there are from 7 to 12 fathoms of water. Till this vicinity can be thoroughly examined, it will be prudent to keep Grange point on an E. by S. $\frac{1}{2}$ S. bearing, and not to approach Monte Christi from the northward.

Monte Christi shoal lies NW. $\frac{1}{4}$ W. 8 miles from Grange point; it is about $\frac{3}{4}$ of a mile long from NE. to SW., and is about 3 miles inside the western edge of the bank. It is composed of small pointed rocks on a white sand-bank, with as little as $2\frac{3}{4}$ fathoms on the heads and 4 to 7 fathoms between them. Monte Christi shoal.

The Seven Brothers are a group of small, low cays on the Monte Christi bank, to the westward of Grange point. They occupy a space of about 7 miles E. and W., and 5 miles N. and S. Most of them are covered with mangrove-trees, and numerous reefs and shoals lie between them. There are said to be passages between them; there is a navigable channel between the cays and the shore. Seven Brothers.

Anchorage will be found under the eastern islet, called Monte Chico, and also under the southern one, called Tororu. The latter lies near the edge of the bank. Anchorage.

Near Grange point, to the SW., are two smaller cays, called the Fraile and Cabras, or Monte Christi. The Fraile islet is the smaller of the two, and lies W. by N. 200 yards distant from the point.

Cabras, or Monte Christi islet, lies 3 cables SW. from the point, is 33 feet high and partly covered with trees. A reef extends 2 cables to the N. and W. of this cay, on which the sea does not always break. In the passage between Cabras islet and the shore there are $1\frac{1}{2}$ to 2 fathoms of water. Cabras islet.

Cabras island has low bluffs at its N. and S. ends, is low in the middle, and will hardly be distinguished from the main-land by a vessel coming from the westward until close to.

There is an excellent anchorage between Cabras island and a rocky cay or reef S. by W. $\frac{3}{4}$ of a mile from it. Five fathoms will be had until directly between them; then the water shoals very gradually toward the shore and the bottom becomes soft. There are no hidden dangers in this Anchorage.

vicinity except a small shoal, with from $2\frac{1}{2}$ to 4 fathoms over it, $\frac{3}{4}$ of a mile to the westward of the anchorage.

From the shoalest spot of this danger the middle of Cabras island bears NE. by E., and the middle of the rocky cay above mentioned SE. by E. $\frac{1}{2}$ E. It will be avoided by keeping less than $\frac{1}{2}$ a mile to the westward of the line passing through Cabras island and the rocky cay, in 6 and 7 fathoms of water.

This anchorage is completely protected from the trade-winds, which blow constantly during the day in summer time, and the water is very smooth.

From Grange point the coast takes a southwesterly direction for 5 miles, to Yuna or Sable point. Between these two points is the town and anchorage of Monte Christi, overlooked by a remarkable hill of the same name, crowned by fort Francisco, about 1 mile from the shore, and at the extremity of the great mountain-ridge which extends hence along the shore to cape Viejo Frances. When seen from the NNW. about 5 miles distant, the summit of the hill has the appearance of a saddle with several white spots on its declivities. There is also a small fort on the shore to the westward of this, and two others between it and Grange point.

At the beginning of the present century the river Yaque emptied into the bay a short distance SW. of the village, but it now empties into Manzanillo bay, 10 miles farther to the southward.

Anchorage.

Anchorage will be found in 6 to 8 fathoms of water, with the south point of Cabras islet bearing E. $\frac{1}{2}$ a mile distant, and the centre of the town SE. by S.

Directions.

In navigating off this part of the coast, when steering to the westward, if it is desired to pass to the northward of all the off-lying dangers just described, from a position 12 miles north of Cape Isabella a course northward of W. should be steered to allow for the inshore set of the current, and to give the Monte Christi bank a good berth.

When Grange point bears S., a vessel will be to the westward of the Grange shoals, and when Tercero cay, the most northerly of the Seven Brothers, and the third, counting from the eastward, bears S., she will be westward of Monte Christi shoal.

If bound to Monte Christi from the eastward, steer from cape Isabella for Grange point, making allowance for the inset of the current, and round it less than 1 mile distant, to avoid the inner Phaeton shoals.

In approaching the anchorage from the westward, Grange point should be brought to bear ESE., and approached on that bearing, thus keeping to the southward of the Liverpool, Phaeton, and Monte Christi shoals.

In nearing the Seven Brothers it must be remembered that the current N. of them generally sets to the SE. On the bank the flood-tide runs to the SW. at the rate of $\frac{1}{2}$ a mile an hour, and the ebb to the NE. at the same rate.

Point Yuna or Sable, the southern limit of Monte Christi bay, has an off-lying reef to the N. and W. of the point, with a 2-fathom channel, 3 cables wide between it and the shore.

In approaching Manzanillo bay from the eastward, the bank of Monte Christi may be crossed with safety. Being $\frac{1}{2}$ a mile NW. of Grange point, steer to the westward till Yuna point bears S., when steer for it till Monte Chico bears W. Then alter the course to SW., and passing to the eastward of Tororu cay give Icacos point a berth of 1 mile, and haul up for for Manzanillo point.

Immediately to the eastward of Manzanillo point there is secure and accessible anchorage in the bay of the same name. The shores of the bay are low, and covered with mangroves, the eastern shore forming the delta of the Yaqui River. The entrance between Manzanillo point and the S. shore is over 3 miles wide. On the S. shore is the mouth of the river Massacre, or Dajabon, forming the northwestern boundary between the territories of Hayti and Santo Domingo.

Manzanillo bay.

Massacre or Dajabon river.

There is no danger in Manzanillo bay; an excellent, well-sheltered anchorage will be found E. of Manzanillo point, about $\frac{1}{2}$ a mile off shore in 7 fathoms, muddy bottom. The edge of the bank of soundings is very steep, and on the eastern side of the bay is only $\frac{3}{4}$ of a mile off shore. In the middle of the bay no bottom has been reached.

Anchorage.

The coast continues low to the entrance of Port de Fort Dauphin, 6 miles W. of Manzanillo point. This harbor is an excellent one, being perfectly sheltered, commodious, and affording excellent holding-ground, with a depth of water

Port de Fort Dauphin.

sufficient for vessels of the largest size. The entrance is so narrow and crooked as to render it difficult for a sailing-vessel, except with a commanding breeze. Shoals make off for a short distance from the points in the channel, making the turnings so short that with a long vessel great care must be exercised. No directions can be given for the entrance except to keep in mid-channel, for which the eye will be the best guide. This narrow channel, 1 mile from its entrance, widens into a land-locked basin 3 miles long and 1 mile wide, and free from shoals except to the eastward of Fort Dauphin. There is a small islet near the middle of the bay called Boyan, with a reef extending 1 cable off its NE. side. A good berth will be found in 13 fathoms of water between Fort Dauphin, on a point north of the town, and Boyan islet.

Boyan islet.

Tides.

It is high water, full and change, at Port de Fort Dauphin at 7^h. Spring-tides rise $5\frac{1}{2}$ feet; neaps $3\frac{1}{2}$ feet.

Caracol bay.

Little is known with regard to Caracol bay, situated 9 miles W. of fort Dauphin, between Yaquezi point on the east and Caracol point on the west. This part of the coast is skirted by the great reef which, commencing about 1 mile west of Fort Dauphin harbor, sweeps to the northward toward Cape Haytien.

Caracol bay is 4 miles wide, but is too shallow for use by any but very small vessels, which reach the anchorage inside the reef either by a narrow cut to the eastward, or from the westward by a crooked channel NE. of point Caracol. There is also a channel connecting this bay with Cape Haytien harbor.

Limonade bay
and village.

The bay and village of Limonade lie 6 miles to the westward of Caracol bay. Coasters find shelter here under the reefs, passing through a deep cut in the reef running NW. and SE.

From this the coast continues to the westward to the town of Cape Haytien, and then turning to the northward forms the eastern shore of the promontory of the same name.

Cape Haytien
or Guarico.

The harbor of Cape Haytien, or Guarico, formerly called Cape Français and afterward Cape Henri, is sheltered on the south and west sides by the coast of Santo Domingo, and to the east and northeast by sand-banks and reefs. Al-

though it is open to the northward, the anchorage is well sheltered in that direction by banks and shoals within the harbor, which is easy of access in the day-time. The approaches to the anchorage are not lighted, nor are the buoys on the shoals to be depended upon.

The town of Cape Haytien stands on a small plain on the west side of the harbor, at the foot of a high range of mountains called Haut du Cap, which rising abruptly a short distance north of the town, attain, 1 mile west of it, an elevation of over 2,300 feet. The entrance to the harbor is formed by point Picolet on the west and the reefs on the eastern side. On point Picolet is a fort with white walls, and $1\frac{1}{2}$ cables northwest of it is a small barren rock.

SW. $\frac{1}{2}$ W. of point Picolet is the mountain of the same name, 963 feet high, on which is a lookout; $\frac{1}{2}$ a mile southward of Picolet point is fort St. Joseph, and on the shore between them are the ruins of an old gateway.

The shore to the southward of the town is very low. On it, a little more than 1 mile SE. of the town, is the village of Petit Anse; between is a small hill covered with trees, having a ruined fort on it.

The principal shoal in the harbor, and the nearest to the entrance, is Le Grand Mouton, 4 cables long north and south, and 2 cables broad. The sea generally breaks on its northern end, which lies E. by S. from fort St. Joseph. About 1 cable eastward of the south end is a small coral head, generally surmounted by a beacon, and marked by a red buoy moored immediately east of it and close to.

Le Petit Mouton is a smaller shoal, generally visible, lying SE. by E. $3\frac{1}{2}$ cables from Le Grand Mouton.

La Trompeuse is a small shoal near the middle of the bay, lying $\frac{1}{2}$ mile south of the Grand Mouton, and a little more than that distance east of the Tour d'Estaing is a ruin on the shore near the north part of the town.

On the eastern side of the harbor, and a short distance SE. of La Trompeuse shoal, is the Belier shoal, an extensive sand-bank of irregular shape, $\frac{1}{2}$ a mile long north and south. A short distance farther to the SE. is Grammont island, a small cay formerly used as a careening place.

Between Grammont island the Belier shoal is the inshore channel toward Caracol bay.

Water and supplies.

From the reservoir, which supplies the town, a pipe leads down to the water's edge at the wharf, close by the obelisk. During the day the water does not run very rapidly, but, by obtaining the proper permission, casks may be filled after 10 p. m. quickly and easily. In the dry season (August and September) the supply is scanty, and water must then be obtained from the river, which empties at the SW. angle of the harbor. Wood, coal, and fresh provisions of all kinds may be obtained.

Directions.

In approaching the harbor of Cape Haytien from the eastward, a vessel should steer about WSW., after passing the Monte Christi shoal, till the highest part of the mountains of Haut du Cap bear about SW. Then steer for them till the fort on point Picolet is sighted. This fort should be brought to bear SSW., and approached on this bearing. A pilot can generally be obtained off this point, and a stranger should take one. They should, however, be carefully watched and not implicitly trusted. In standing in SSW. for point Picolet, as soon as cape Hayti, the northern point of the promontory, bears W. a vessel will be abreast of the north-west point of the reef called the Coq-Vieille, and may then haul to the southward.

The point of the Coq-Vieille is generally marked by a red buoy planted in 5 fathoms of water.

Le Grand Mouton shoal divides the approach to the anchorage into two channels, either of which may be used by vessels of the largest size.

West channel.

To take the western passage, bring point Picolet to bear N. $\frac{3}{4}$ W. and keep it so, steering S. $\frac{3}{4}$ E.; this course will lead west of Le Grand Mouton, east of a salient shoal on the western shore, and directly to the anchorage south-west of La Trompeuse.

East channel.

To take the channel east of Le Grand Mouton, bring the barren rock NW. of fort Picolet open a very little clear of the point and keep it so, steering SE. $\frac{1}{4}$ S. till the beacon or buoy on the coral head, SE. of Le Grand Mouton, bears south, when haul to the southward, and, rounding the buoy on the starboard hand, steer to the southward and westward for the anchorage.

Clearing-marks.

The following clearing-marks are by Mr. J. Roberson, master of H. M. S. Lily, 1866. The southern angle of the

custom-house in line with the eastern gable of Masonic Hall, SW. by W. $\frac{3}{4}$ W., leads 50 yards to the southward of Grand Mouton.

The white obelisk at the watering-place in line with the flag-staff of the British consulate leads $\frac{1}{2}$ a cable to the southward of Grand Mouton. The custom-house just shut in with the end of the north wharf leads to the northward of La Trompeuse. The pillars of the ruined gateway between forts St. Joseph and Picolet open of fort St. Joseph leads to the eastward of the shoal stretching off shore in the western channel.

In approaching Cape Haytien harbor from the westward, a vessel should keep at least $1\frac{1}{2}$ or 2 miles off shore to avoid the coral reefs skirting the shore.

Steamers may enter and leave this port at any time when the leading marks can be seen, but sailing-vessels must enter with the sea-breeze and leave with the land-breeze, which blows during the evening and night from ESE. to SE. and dies away about 10 o'clock a. m. After an interval of calm the sea-breeze springs up about 11 o'clock a. m., blowing from NE. to ENE.

Throughout the twenty-four hours the winds off shore blow from the eastward except when interrupted during the winter, for a short time, by north and NW. winds. The former causes much sea in the harbor and outside, and lessens or overpowers the land-breeze, so that until the sea goes down and a steady land-wind blows at night a sailing-vessel's departure had better be delayed.

After N. or NW. winds have been blowing for some days the current sets strongly to the eastward along this part of the coast.

It is high water, full and change, at Cape Haytien at 6^h 0^m, and the tide rises about 3 feet.

Westward from Cape Haytien harbor, at the distance of 5 miles, is Port Français, a small bay which, though open to the N. and NW., affords good anchorage with ordinary winds.

Point St. Honoré, the eastern point of the bay, is skirted by a reef to the northward to the distance of 1 cable. To enter the bay haul round this reef, leaving on the starboard hand two other small reefs nearly awash, off those reefs

Land and sea
breezes.

Currents.

Tides.

Port Français.

which skirt Baro point, the southern limit of the bay; then standing about $\frac{1}{4}$ mile to the southward, anchor in from 8 to 10 fathoms, with the fort bearing ESE.

The point on which the fort is situated projects so as to divide the bay into two smaller ones, of which the northern affords the best anchorage. In the middle of the southern one there is a small reef, and its shores also are foul.

Little Port
Français.

To the westward of Baro point is Little Port Français, only accessible to coasters that can pick their way through the intricate mass of reefs and sand-banks which, commencing here, extend to the westward 5 miles, obstructing the mouth of Acul harbor, which is a well-sheltered inlet, narrow and deep, 4 miles in length north and south and of variable width; in some places less than $\frac{1}{2}$ a mile. The water is deep enough for ships of the largest draught, and in some places the shores are steep-to.

Acul harbor.

There are three channels into the harbor, the eastern and middle channels between the reefs, at the mouth of the harbor, and the western or Limbé channel, safer and less intricate than the others, west of the reefs and between them and the coast south of Limbé island.

Limbé island.

This little island is of circular shape and lies close to the shore off Marigot point, which is overlooked by a conical hill. Three-quarters of a mile to the southward is Icacos point, a bold, rocky bluff, forming the western point of entrance to the Limbé channel, the eastern side of which is the Vieille or Coquevieille cay or reef. Immediately to the eastward of this latter obstruction is Philipot cay, low and sandy, with Rat islet, low and woody, $\frac{1}{4}$ mile ESE. from it and Sand cay, also small, low, and sandy, 1 mile farther to the eastward. These islets and cays are surrounded by an intricate mass of reefs with deep channels between them.

Icacos point.

On the western side of Acul bay, south of Icacos point, there are two other salient points, Gran Boucaud point, $\frac{1}{2}$ a mile SE. of Icacos point, and Belié point, on which there is a remarkable clump of trees, which has an off-lying shoal to the distance of 2 cables.

On the eastern side the first point is called Trois Maries; it is skirted by a bank to the distance of 2 cables, on which is an islet or rock called Boyan.

South of Trois-Maries is Morne Rouge point, steep to on its western side, and farther to the southward is Maho point.

The south part of the bay is full of shoals.

To enter the eastern channel from an offing of at least 3 miles, bring Rat islet to bear S. by W. $\frac{3}{4}$ W. and steer for it. From this distance Trois-Maries and Bélie points, described above, will be easily recognized. These two points in one will lead between the reefs in mid-channel with slight deviations to keep in a depth of 9 or 10 fathoms. On the edges of the banks on either side there are 4 fathoms.

After passing Rat island the channel widens, all the dangers are visible, and a vessel may, if desired, anchor outside the harbor in 13 to 16 fathoms, with the islet bearing NW. Eastern channel.

If it is desired to go farther in, give Trois-Maries point a berth of at least 3 cables, and stand to the southward in mid-channel. There is said to be a shoal WSW. of Trois-Maries point. Having passed this, the vessel will be in the outer basin, and may anchor in from 9 to 13 fathoms. To enter the inner basin, Morne Rouge point must be rounded at the distance of $\frac{1}{2}$ a cable, when excellent anchorage will be found in the cove called Lombardo, or in the Carénage S. of it, in $6\frac{1}{2}$ fathoms of water.

To enter by the middle channel into Acul bay it is necessary for a sailing-vessel to have the wind well to the northward and steady, as she will have to haul up as high as SE., and there is no room to work. When at least 3 miles to the northward of Rat islet bring it to bear S. by E. and steer for it. When within $1\frac{1}{2}$ miles of Rat islet it will be seen that this course leads just to leeward of some reefs to the northward of it; haul round these reefs, leaving Rat island and the reefs which surround it on the starboard hand. When Rat island bears NW., either anchor or stand farther into the harbor, as before directed. The reefs in this channel can all be seen, but a vessel taking it must be prepared to anchor instantly should the wind die away or haul ahead. The holding-ground is good. The western or Limbé channel is the widest and best. To enter it, bring Iacos point to bear S. or S. by W. and steer for it. As it is approached, the sea Middle channel.
Western channel.

will be seen breaking on the eastern side of the entrance on Coquevieille' cay or reef, steer midway between it and the point in 9 to 14 fathoms of water, so as to pass 3 or 4 cables from Gran Boucaud point.

As the various charts of this locality differ, these instructions must be used with caution.

Limbé anchor-
age.

To the southward of Limbé islet there is an anchorage for small vessels, sheltered to the northward by the islet of Limbé and by the reef called the Roche Pauvre, which extends to the eastward from Limbé point. This anchorage abreast of the village of Limbé, is exposed to easterly winds, and is only fit for coasters drawing less than 1 fathom of water which anchor between the reefs off the coast and those surrounding the islet.

Point Margot.

The next point to the westward is called Margot. It has a small round islet off it, useful as a landmark. Immediately to the westward of Margot point and islet, both of

Chouchoux bay.

which are steep to, is a little cove called Chouchoux bay, open to the northward, but affording good temporary anchorage. To enter it under sail, stand close in round Margot point and be ready to anchor as soon as the ship loses her way, as it is almost always calm inside. Separated from Chouchoux bay by Baril-du-Bœuf point is Salt River bay, which also is open to the northward, and only fit for coasters. Both the eastern and western points of the entrance are skirted by a reef at a short distance.

Fond la Grange
bay.

The bay of Fond-la-Grange lies 4 miles W. of Chouchoux bay, between point Jean Aubé on the E. and point Palmiste on the W. It is easily distinguished by a chain of reefs $1\frac{1}{2}$ miles off shore, which extends from the latter point to the westward nearly as far as Icague point, 4 miles distant. This bay affords good anchorage for vessels of the largest draught. Its entrance is $\frac{1}{2}$ a mile wide, and it is perfectly easy of access. To enter it, it is only necessary to keep the eastern point aboard.

The holding-ground is good, consisting of sand and mud. The least depth, at 1 cable from the shore, is $5\frac{1}{2}$ fathoms. A vessel may anchor, as convenient, in the middle of the bay.

Bay and river
of Borgne.

To the westward of Fond-la-Grange bay, and only separated from it by point Palmiste, is the little cove of Borgne, with the small river of the same name emptying into it.

Coasters anchor in $2\frac{1}{2}$ to $4\frac{1}{2}$ fathoms in the bay, which is open to the northward.

From here to Icague point the coast is formed of bluffs, and is skirted with shoals and sunken rocks to the distance of $1\frac{1}{2}$ miles off shore. Between these two points is the small boat harbor of Lavand. To the westward of Icague point is the small bay of the same name, with the Bas-de-Saint-Anne river emptying into it. It is only fit for boats.

Lavand harbor.
Icague bay.

A quarter of a mile west of Icague point a chain of reefs commences, bordering the coast for the distance of 3 miles to cape Rouge, with a narrow channel between the reefs and the shore having a depth of $1\frac{1}{4}$ to $2\frac{1}{4}$ fathoms of water. Through this reef are several cuts, but there appears to be none between the eastern end of the reef and point Icague. Icague bay and the river Bas-de-Saint-Anne may be reached through the first cut to the westward, where there is anchorage for small vessels in $2\frac{1}{4}$ fathoms of water; bottom, sand and weeds.

Between Icague point and Grand point are the following anchorages, only fit for small coasters; the bay and river of Cape Rouge, with $1\frac{1}{4}$ to $2\frac{3}{4}$ fathoms of water, well sheltered by the reefs; the bays of Great and Little Marigot, with $2\frac{1}{4}$ to $3\frac{1}{4}$ fathoms; and the bay of Petit Rivière. These last anchorages are somewhat sheltered to the northward by Tortuga island, but hardly at all to the eastward.

Anchorages..

Between Grand point and Point de la Paix the coast is clear. The latter point is the northern extreme of the island of Santo Domingo, and immediately W. of it is the little bay of Port Paix, with Trois-Rivières point on its W. side. This little bay affords good anchorage, being protected to the northward by Tortuga island, and is open only from NW. to W. The town, formerly protected by two small forts now in ruins, is on the southeastern shore of the bay. The land in the rear of the town is high, with a rather remarkable small conical hill sloping to the westward. From Perez point north of the town a reef is said to extend 600 yards. H. B. M. schooner *Bermuda* anchored here in December, 1854, and her commander remarks:

Port Paix.

"The port is well sheltered, not only by the island of Tortuga but also by a reef running off from a point on each side of the harbor, that on the E. side for about 1 mile in a

NE. direction. The town should be wide open of this point before running into the bay, and a wide berth given to the reef. The reef on the W. side extends for a short distance in a northeasterly direction, but it can be plainly distinguished from aloft, as the water surrounding it is very clear.

"When at anchor, the fort on the eastern point bore ENE.; the fort on the western point, W. The vessel lay not more than 3 cables' length from the shore, and shoal water within about a third of that distance."

To enter Port Paix a vessel should be under easy sail or steam, and having brought the village to bear SE., should steer for it, and anchor as soon as a less depth than 20 fathoms is reached, which will be about $1\frac{1}{2}$ cables off shore. In front of the town, about 100 yards from the beach, is a rock, which must be avoided by small vessels seeking an anchorage close in.

Tortuga island. The island of Tortuga is 24 miles long ESE. and WNW., and 8 miles wide. The centre of the island is moderately high, with low land at either end. The northern side is bold, steep, and inaccessible, while the southern shore is skirted by numerous reefs and shoals. The only good anchorage the island affords is situated on the S. coast $4\frac{1}{2}$ miles from point Portugal, the SE. point of the island, called **Road of Tierra Baja.** **Tierra Baja road.** It is surrounded and sheltered by reefs stretching out from the coast, and is only fit for vessels drawing 14 or 16 feet of water, as the bottom is irregular, and the soundings vary from 3 to 6 fathoms.

To enter the anchorage, the village should be brought to bear NW. and should be approached on this course, which will lead between the reefs, which break and are easily distinguished by the eye. A good berth will be found in 6 fathoms of water, with sandy bottom, and with the village on the above bearing. At the entrance of this channel, called the eastern passage, there is a bank, with only $3\frac{1}{2}$ fathoms in mid-channel. The western passage has only 10 feet of water. Large vessels may anchor outside of the reefs, on the white ground, about 1 mile to leeward of the town.

Between Tierra Baja anchorage and Portugal point there are several small coves, affording temporary anchorage to small coasters.

There is also said to be anchorage under the western end of the island.

The channel between the island of Tortuga and Santo Domingo is 4 miles wide in its narrowest part, and, as there is an easterly current generally setting through, it may be advantageously used by vessels bound to the eastward. In the day-time it is perfectly safe to beat through, as the reef can be seen, but it should not be attempted at night.

Tortuga channel.

There is an easterly set through this channel during a greater part of the year. On both sides of the channel, however, a contrary eddy may generally be found 1 mile off shore. They should not, therefore, be approached within that distance. A westerly current is only found here when southerly winds have been blowing for some days, which is rarely the case. If, however, a westerly current is experienced, vessels bound to the eastward should, instead of entering the channel, stand 15 or 20 miles to the northward. The winds are more variable in the channel than outside.

W. of port Paix, 2 miles distant, between Trois-Rivières and Vigie points, is the bay or cove of the river Salée, sheltered from easterly winds, and affording, in case of necessity, anchorage with sandy bottom in 8 fathoms of water.

River Salée bay.

Between port Paix and Vigie point the shore is low and the land flat for a considerable distance inland, but between Vigie and Moustique points the coast is formed by high bluffs, with rocky bottom, extending a considerable distance off shore. This vicinity should be avoided by a sailing-vessel, unless she has a working breeze.

Moustique bay is about 10 miles WSW. of port Paix. Its entrance lies between Moustique point on the E. and Point de Fer on the W., and is hardly 4 cables wide, being narrowed by a reef with 10 to 16 feet of water on it, stretching off from the latter point. The bottom is very uneven and strewn with rocks, making it necessary to pick out a clear place before anchoring. In the entrance there is a depth of 27 fathoms, irregularly diminishing toward the head of the bay, where a small stream empties.

Moustique bay.

On the western side of the bay there is a small islet, and SE. of it a small rock. The best anchorage is with this rock bearing about W. in 20 or 25 fathoms of water, near the middle of the bay. The bank is so steep that it is pru-

dent to be certain that the vessel is on soundings before anchoring.

Port á l'Ecu.

Port á l'Ecu or Escudo is $4\frac{1}{2}$ miles W. of Moustique bay; between them the coast is steep-to, bluff, and high. Port á l'Ecu is a better anchorage than Moustique bay, although the entrance is narrower on account of the reef which, extending a distance of 2 cables from the eastern point, skirts the eastern side of the bay. On the reef there are 2 fathoms and at its edge 7 fathoms of water.

This is not an easy harbor for a sailing-vessel to work into with the usual winds. In entering, the eastern point must be given a good berth on account of the above reef; then hauling close to the wind a good berth will be found in $7\frac{1}{2}$ fathoms of water, sandy bottom, with a remarkable house on the southern shore, bearing SSW.

It is high water, full and change, at Port á l'Ecu at 6^h. Spring-tides rise 3 feet.

Juan Rabel bay.

The bay of Juan Rabel, between Salina point on the NE. and point Icagua on the SW., is a good and accessible anchorage. Salina point is low, bushy, and prominent; the shore in the neighborhood is diversified by bold, rocky cliffs and sandy beaches, and the interior is mountainous and broken into ridges. A remarkable peak, resembling the ruins of a castle, rises SW. $\frac{1}{2}$ W. from the bay about 2 miles inland.

The eastern shore is skirted by a reef, steep-to, with 8 fathoms clear to the edge. The best anchorage for large vessels will be found $\frac{1}{2}$ a mile NNW. of the town in 13 fathoms of water and $\frac{1}{2}$ a mile from the reef, outside of a line drawn between the two points on the eastern shore; inside of this line the soundings diminish very rapidly and the bottom becomes foul. To the left of the town there is a white bluff and a sandy beach, extending to the NE. as far as point Salina.

From Juan Rabel bay to the point of St. Nicolas mole the coast is bold, rocky, and steep-to, presenting no shelter, and is so inaccessible as to have received the name of the Iron coast.

To the NW. of Salina point, $2\frac{1}{2}$ or 3 miles distant, with half of Tortuga island open clear of the point, soundings

will be obtained in 60 fathoms, and beyond it 80 fathoms, muddy bottom.

The current about 6 miles off the NW. coast of Santo Domingo generally sets to the NE., but within that distance it inclines toward the land and decreases in strength. As, however, the Windward channel between Cuba and Santo Domingo is approached, it tends to the SW. and increases in strength.

Currents.

CHAPTER VIII.

MONA PASSAGE AND THE ISLAND OF PUERTO RICO.

Variation in 1876:

Mona Island, 1° E. | East end of Puerto Rico, $0^{\circ} 20'$ E.

THE MONA PASSAGE.

The channel between the islands of Santo Domingo and Puerto Rico is about 65 miles wide and clear of obstructions or danger. It is called the Mona passage, from the small island of that name lying nearly midway between cape Rojo and Saona island. There are two other small islands in the channel—Monito, close to Mona island, and Desecheo, or Zacheo, in the northern part of the channel.

Mona island is about 6 miles long NW. and SE. and 3 miles wide. On the N. and E. sides it is about 175 feet high, and on the S. and W. sides from 80 to 105 feet high. Its summit is nearly flat, with a few bushes and trees, and it may be seen from a distance of 18 miles.

The island is of volcanic formation; its N., E., and W. sides, consisting of high perpendicular bluffs, afford no landing-place.

The surface of the island is composed of calcareous slate-colored rock, full of holes containing soil in which the trees and brushwood grow.

There are numbers of wild goats and hogs on the island, and turtles during the season.

From the cliff at its SW. end a low sandy spit projects some distance. A ridge of rocks runs 300 yards off this point, and a vessel should not come inside the depth of 8 fathoms of water, which will be found at the distance of $\frac{1}{4}$ of a mile.

The eastern and northern parts of the island are said to be clear of danger and steep-to. The NW. end terminates in a promontory and its extremity rises to a lofty perpen-

dicular rock, which when on a N. $\frac{1}{2}$ E. or S. $\frac{1}{2}$ W. bearing has the appearance of a sail, with Monito open westward of it. From this end, named cape Barrionuevo, round by S. to the E. end, the island is bordered by a bank of white sand and rocks with 18 to $3\frac{1}{2}$ fathoms water on it. It extends off $1\frac{1}{2}$ miles between capes Barrionuevo and Julia, and $\frac{1}{2}$ a mile between this latter cape and the E. end of the island. Within the line of $3\frac{1}{2}$ fathoms water there are several heads of rocks, and the southwestern shore is skirted at the distance of 300 yards by a broken reef through which a boat may, with some difficulty, pick its way to the landing. The best opening will be found with the SW. end of the cliff bearing ESE. In the centre of Santa Isabel bay, SE. of the western point, there is a clear beach about 150 yards in length where a landing may be effected under favorable circumstances by veering the boat in from a grapnel. The points forming this bay are shallow.

A little to the right of the landing on Mona island there is a pathway leading to water under the southern cliffs; here also fire-wood will be found. Water is found in the lower parts of the grottoes, but of poor quality.

The best anchorage will be found in the bay between the NW. and SW. points of Mona island, with the latter point bearing S. $\frac{1}{2}$ W. $1\frac{1}{2}$ miles, the former NE. $\frac{1}{4}$ N., the SW. end of the cliff ESE., and Monito N. $\frac{1}{4}$ E. in 7 or 8 fathoms. The soundings here are regular, with a sandy and grassy bottom, and the depth is 4 fathoms close to the edge of the reef, but the ground to the northward of this is rocky and foul.

In approaching the anchorage off Mona island from the southward, having rounded the ledge off the SW. point, as directed above, and brought it to bear E., haul up, and if the vessel cannot fetch it, stand freely to the northward; but on the southern board take care not to bring the SW. point to the westward of S. by W., to avoid the reef which skirts the shore.

It is high water, at full and change, at Mona island at 6^h 15^m, and the tides rise and fall about 2 feet. The flood sets N. $\frac{1}{2}$ E. and the ebb S. $\frac{1}{2}$ W. at the rate of $\frac{1}{2}$ a mile an hour.

The little island of Monito, about 400 yards in diameter, lies $2\frac{1}{2}$ miles NNW. of Mona island. It is of circular form,

Water.

Anchorage.

Tides.

Monito island.

is steep-to, and nearly inaccessible, its sides being formed of steep cliffs. A short distance west of this islet there is a small bank of soundings, with from 20 to 25 fathoms of water at 100 yards distance.

The only place where landing can be effected, even with very smooth weather, is at a rock on the west side of the islet. At all times great caution is necessary.

Desecheo
Zacheo islet.

or Desecheo or Zacheo is a small rocky islet lying NE. by E. 26 miles from Mona island, and W. $\frac{1}{2}$ N. $11\frac{1}{2}$ miles from Jiguero point, the west extreme of Porto Rico. It, 1 mile in circumference and being covered with trees, has from a distance the appearance of a green mountain. Its height is such that it can be seen from a distance of 36 miles. The shores of Desecheo island are steep-to, and present no hidden dangers. The vicinity affords no anchorage.

Currents.

Near the sides of the Mona passage there is generally a very perceptible current, frequently running to the north and northwest with a velocity of 1 mile or $1\frac{1}{2}$ miles an hour. In the middle of the passage the general direction of the current is with the wind to the SW. The tides also, in some parts of the passage, run with great force, especially to the southward of Cape Engaño, where, during the month of May, a velocity of $3\frac{1}{2}$ miles an hour has been experienced. The flood runs 9 hours to the SW., and the ebb to the NE. during 3 hours. Sometimes precisely the contrary duration occurs, and the tides have been known to run 6 hours in each direction. These irregularities necessitate great caution in navigating, and have doubtless been the cause of very many disasters.

The Mona passage is much frequented by vessels bound from ports in the United States to the Spanish main and neighboring islands, and by those from Europe bound to Jamaica and ports on the southern coasts of Santo Domingo and Cuba. Especially is this the case in the winter, when the wind is apt to blow from the northward of east.

It has already been stated that this passage is free from danger; but great caution must be used in the vicinity of Saona island, which is low and foul, and a berth of at least 6 miles should be given it. Squalls are of frequent occurrence, especially in summer. They blow sometimes with

hurricane force for a short time, and although they often rise rapidly, always give warning of their approach.

PUERTO RICO.

The island of Puerto Rico was discovered by Columbus in 1493. In 1509 it was invaded by Spaniards from Santo Domingo, and has since that time been a Spanish colony.

The island is nearly in the shape of a parallelogram, 93 miles long E. and W. and 33 miles wide.

A range of lofty mountains called Sierra Luquillo, covered with wood and intersected by numerous deep ravines, runs through the centre of the island, beginning near the N.E. point and terminating south of Arecibo in a hill called the Silla de Cabello. The highest peak of this chain is about 11 miles WSW. from the Cabeza de San Juan, the N.E. point of Puerto Rico. Being nearly 3,700 feet high and visible in clear weather from a distance of 68 miles, it forms an excellent landmark. It is called El Yunque or Anvil Peak. In the interior are extensive savannas, on which large herds of cattle are pastured, and along the coasts are tracts of level fertile land.

The principal ports of export are San Juan and Arecibo on the north coast, Mayaguez and Aguadilla on the west, Ponce, Arroyo, Guayanilla, and Guanica on the south, and Humacao and Naguabo on the east coast.

The exports are principally sugar, molasses, rum, tobacco, cotton, coffee, hides, and cattle.

Gold is found in small lumps and in dust in the streams flowing from the headland. Copper, iron, lead, and coal have also been found.

The population in 1867 was 656,328, of whom 309,891 were slaves. Slavery was, however, abolished in the island in 1873. Although the island of Puerto Rico is south of the usual track of hurricanes, it has been severely visited by them. The cyclones of 1782 and 1825 were especially destructive.

The coasts of the island are by no means well known, and urgently need to be resurveyed.

On the eastern coast of Puerto Rico there are nine small rivers emptying into the sea, and several ports, frequented

East coast.

by small vessels to load with sugar and molasses. The instructions which can be given for this coast are so deficient that it would be by no means safe for a stranger to cruise here without a pilot, who may be obtained at San Juan, St. Thomas, or sometimes at port Mula on Viques island.

Cordillera.

A chain of islets and reefs, called the Cordillera, extends from about $\frac{3}{4}$ of a mile from St. John's head, (the NE. extremity of the island,) in a direction about ESE. for 11 miles. The eastern group of these islets is called the Barriles; they are steep to, and between them and the Washer and Cactus cays (page 433) there is a channel 2 miles wide and 10 fathoms deep.

Barriles pas-
sage.

With a SE. wind a vessel bound northward may easily pass to the eastward of Puerto Rico and through this channel. It is also available for vessels bound from the N. to any of the ports on the E. or S. coasts of Puerto Rico.

Hermanos pas-
sage.

The next channel through the reef is between the Barriles and the Hermanos rocks. This channel, called the Hermanos passage, is 2 miles W. of the Barriles passage and has about the same depth and width. The third and western channel lies between St. John's head and the western end of the Cordillera. It is $\frac{3}{4}$ of a mile wide and 9 to 10 fathoms in depth. The western extremity of the Cor-

Icacos rocks.

Cucaracha rocks.

dillera is composed of two groups of low rocks, the Icacos, lying $\frac{3}{4}$ of a mile NE. of St. John's head, and the Cucaracha, about the same distance N. of the same point.

There is also a navigable passage between these two groups of rocks, and probably others at different points thorough the Cordillera, but no trustworthy directions can be given for them.

Puerto Fajardo.

Puerto Fajardo lies $3\frac{1}{2}$ miles S. of St. John's head, the NE. extremity of the island. It is between Cuava point on the N. and Barrancas point on the S., and has a depth of from 16 to 23 feet.

Obispo islet.

On a point abreast of Obispo islet is a battery, and a few houses are scattered along the beach. The town of Fajardo is $1\frac{1}{2}$ miles inland. This port is only a narrow canal, sheltered from easterly winds by three islets, called Obispo, Zancudo, and Ramos, and also by a reef between the two latter, having 6 to 12 feet of water on it, where the sea breaks in some places. The northern and southern ends of

Zancudo islet.
Ramos islet.

this reef form, with the islets of Zancudo and Ramos, two narrow cuts, having 23 feet of water. The southern passage is the widest, but neither should be attempted except in case of emergency.

There are two entrances into Puerto Fajardo. Through the southern one a depth of 18 feet may be carried, and it is entirely clear. It lies between point Barrancas and Ramos islet. Puerto Fajardo.

The northern entrance is between point Cuava and Obispo islet, and has from 4 to 6 fathoms of water. Nearly in the middle of the passage is a coral-patch, with only 6 feet of water on it, which requires great care to avoid. Although narrow, this channel is the best to enter by.

In approaching Puerto Fajardo from the eastward through the channel between Culebra and Vieques islands, the navigator may choose from three channels: 1st, between the Cordillera reef and Palominos island; 2d, between this island and the Largo bank; and, 3d, between the Largo bank and the chain of islets and reefs extending to the eastward, called Piraguas and the Lavanderas.

Although the first-named channel is the narrowest, it seems the best, from the fact that all its dangers are apparent to the eye. With the wind from NE. it leads to windward of the port. The depth in this channel is from 8 to 12 fathoms; in the second from 7 to 11 fathoms, and in the third from 6 to 8 fathoms.

To pass through the channel between the Cordilleras and Palominos island, bring the S. end of SW. cay on with Soldier point, the S. extremity of Culebra island, and keep it on this bearing until the vessel is to the westward of Palominos island. Then bring its N. point on the same bearing and continue this course until a depth of 6 fathoms is attained, about $\frac{1}{4}$ of a mile off Cuava point, which is $1\frac{1}{4}$ miles S. of St. John's head. Then haul to the southward, keeping about the same distance off shore until Obispo islet bears E., when the vessel may anchor in from 16 to 20 feet of water. Northern channel.

This track is to the northward and then to the westward of the coral-patch spoken of as lying in mid-channel. If it is desired to pass to the southward of it, having hauled round Palominos island, pass close to Obispo islet, keep-

ing El Yunque or Anvil peak bearing W. by S. $\frac{1}{4}$ S., or keeping the north point of Palominos island bearing E. by N.

Middle channel.

To pass through the middle channel between Palominos and Largo bank, the track lies about 1 mile south of Palominos island.

Southern channel.

The southern channel is bounded on the N. by the Largo bank, and on the S. by the Piraguas and Lavanderas rocks and the Pinero islands, with a width of 2 miles. In using it, keep Soldier point on Culebra island, bearing E. $\frac{1}{4}$ S. until the center of Palominos island bears E. by N. $\frac{1}{2}$ N.; the Largo bank will then have been passed and a course may be shaped toward Ramos island to enter Puerto Fajardo by the southern passage.

Palominos islet.

The islet of Palominos lies SE. about 3 miles from St. John's head. It is 1 mile long, of moderate height, and covered with trees. Its shores are foul to the distance of $\frac{1}{2}$ a mile. Anchorage may be found about 1 mile off its western shore in 6 or 7 fathoms of water.

Largo bank.

The Largo bank is about $1\frac{1}{2}$ miles in length N. and S., but narrow and steep-to. The sea generally breaks on it. As before stated, this bank forms the S. side of the middle channel of approach to port Fajardo.

Between Largo bank and Ramos islet, $1\frac{1}{2}$ miles to the westward, there is a clear channel with 7 fathoms of water in it. The least water on the bank is said to be 13 feet.

Pinero islands.

Great and Little Pinero islands lie 2 miles northward from Pinero point, the eastern extreme of Puerto Rico.* Farther to the eastward, and forming a chain of dangers, are the Lavanderas rocks and the Piraguas. There are deep channels among these rocks and shoals, but without a pilot it would be prudent to pass to the eastward of them.

The Pineros are two small islets, covered with wood and lying between Medio-Mundo point and Pinero point, which is also low and wooded. On the western side of Great Pinero is a reef which extends northerly to Medio-Mundo point, forming a bar, on which there is only 13 feet of water. The channel between this islet and the main-land is only fit for boats.

Great Pinero.

* The peninsula of which point Pinero is the eastern extreme, as shown on the Spanish chart of 1842, is believed to be more correctly represented as an island called Puelca on the Danish chart of 1849.

Between the reef which extends from the shore between these two points on one side and the reef skirting Great Pinero island on the other, there is a narrow bight where small vessels may anchor, but it is unsheltered to the SE. and S.

Anchorage.

Little Pinero island, or Cabeza de Pinero, is nearly joined to the S. end of Great Pinero by a reef, on which there are 13 feet of water. Near the eastern side of this islet there is a small detached rock, above water.

Little Pinero.

The Spanish chart of 1842 shows a rock called the Descubridor, lying about 1 mile E. by S. $\frac{3}{4}$ S. from the S. end of Little Pinero. Its existence seems doubtful and it does not appear in the Danish chart of 1849.

Descubridor
rock.

The Lavanderas are two small rocks on which the sea generally breaks.

Lavanderas
rocks.

They are steep-to, with 5 fathoms of water close to them. They lie NE. by E. $\frac{3}{4}$ E. from the N. point of Little Pinero; the nearest at the distance of 1 mile, and the other, on the same bearing, nearly $2\frac{1}{4}$ miles distant.

The Piraguas are two small rocky islets, 1 mile apart; they may be seen at a considerable distance. They are steep-to and have a clear passage between them, with not less than 5 fathoms of water.

Piraguas islets.

The easternmost islet lies E. by N. $\frac{3}{4}$ N. 4 miles from Little Pinero.

Two dangerous shoals, called the northern and southern Chinchorro, lie S. $\frac{1}{2}$ W. from the eastern of the Piraguas, at the distance of 1 mile and $2\frac{1}{2}$ miles respectively.

The Chinchorro, s.

The northern shoal is small and has 13 feet of water on it, with 5 fathoms all around. The southern shoal is $\frac{3}{4}$ of a mile long, NE. and SW., and $\frac{1}{2}$ a mile across, with only 5 feet of water on it; it is also steep-to. On both these shoals the sea generally breaks.

A vessel may pass between these dangers or between the northern shoal and the Piraguas. A more prudent course would be, however, S. of all of them. Soldier point, kept on a bearing of E. by N. $\frac{3}{4}$ N., will lead clear of all dangers in the channel between the SE. end of Puerto Rico and Vieques island. A short distance to the southward of Pinero point are the Cabras islets, two small flat cays, covered with brush-wood, with foul ground surrounding them

Cabras islets.

for nearly 400 yards. Puelca point, $1\frac{1}{2}$ miles SW. of Pinero point, is low and sharp, and forms the E. side of the entrance to Bahia Honda. The W. side terminates in a bold headland, crowned by a little hill, near which is a dry rock on the reef. These points are 1 mile apart, but the reef which skirts the interior of the bay extends off from them so far that the entrance is reduced to about $\frac{1}{4}$ of a mile in breadth.

This reef, as well as some patches with 13 feet of water on them, are easily seen.

To enter Bahia Honda, Puelca point should be brought to bear about N. by W. $\frac{1}{4}$ W., when this course will lead up toward the entrance of the harbor. In entering, the eye from aloft will be the best guide for avoiding the reefs and shoal-patches, and for picking out a clear spot for anchoring.

The anchorage has from 5 to 8 fathoms of water, but as it is open to the southward and is quite limited in extent, a large vessel had better lie outside in from 6 to 8 fathoms.

River Agua Clara.

The river Agua Clara empties into the NE. part of Bahia Honda. From the western point of Bahia Honda to point Lima the coast forms a large bay, in the middle of which is the islet of Algodon, moderately high, and near the coast. In this bay, which is sheltered from SW. by N. round to NE., the depth of water varies from 16 to 13 feet near the shore. Three small streams empty into it.

Algodon bay.

Just outside of a line drawn from point Lima to point Algodon, the NE. point of the bay, are three shoals.

Algodon bank.

Algodon bank, the first of these shoals, is nearly $\frac{1}{2}$ a mile in extent, and has 2 fathoms of water on it. It lies with its eastern part S. of the western part of Algodon point, a large round headland presenting, as seen from the S., a facenearly $\frac{1}{2}$ a mile long. The channel between the bank and the point is 400 yards wide, with from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms of water in it. In entering by this channel haul close round Algodon point and anchor in 16 feet of water.

Piedras bank.

The Piedras bank has 2 fathoms of water on it with 20 feet close to. It is separated from the Algodon bank by a narrow channel. The position of this bank is doubtful, but it is about 1,000 yards from Algodon islet, between the bearings of SE. $\frac{1}{2}$ E. and E. by S. $\frac{3}{4}$ S.

The Lima bank is a rocky ledge nearly awash, the sea generally breaking upon it. It is about 600 yards in diameter, and lies $1\frac{1}{3}$ miles E. by S. $\frac{1}{4}$ S. from Lima point and S. $\frac{3}{4}$ W. from Algodon islet. About $1\frac{1}{2}$ miles SE. $\frac{1}{4}$ S. from Algodon islet there is said to be a sunken rock. There is a good channel between the Lima and Piedras banks, in which the least depth of water is 10 feet. To pass through it, bring Lima point to bear W. or W. by S. and steer for it until the S. point of Algodon islet bears NNW. Haul up then for this island and anchor in 16 feet of water, with the island bearing NE. by N. 1,000 yards distant. The anchorage is exposed to easterly winds, and the holding-ground is not good; moreover, as the position of the foregoing dangers cannot be accurately given, the neighborhood must be approached with great caution.

Lima bank.

Doubtful rock.

The port of Naguabo lies between point Lima on the east and Santiago islet $2\frac{1}{2}$ miles to the SW. There are from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms of water, decreasing to 2 fathoms near the shore.

Puerto Naguabo.

One and a half miles west of point Lima the river Naguabo empties. On its western bank is the little village of Nearis, off which in the mouth of the river there is anchorage for a few coasters, with the wind from SW. round by north to east. Large quantities of cattle are exported from here to the other islands. The town of Naguabo lies 2 miles inland.

Santiago islet is small and of moderate height. From it a reef extends in a SE. direction to the distance of 1 mile. Its northern shore is perfectly clear. Three and a half miles southeasterly from Santiago islet is Candeleros point, which may be known by the little hill upon it, and between the point and the islet is Puerto Humacao.

Santiago islet.

Candeleros point is bordered by a reef extending off a short distance. About one mile north of the mouth of the river Humacao, which empties into the bay, are two small islets called the Morrillos.

Puerto Humacao.

No trustworthy directions can be given for the anchorage. The town of Humacao is $2\frac{1}{2}$ miles inland, on the river of the same name.

The naval commandant at Porto Rico gives notice, dated October 16, 1876, that a vessel foundered, on the 13th September, off the mouth of the river Humacao. The wreck lies

in 33 feet of water, 2 miles W. $\frac{1}{4}$ S. from the land at the mouth of the river, a portion of her jib-boom showing above the water.

In approaching either Naguabo or Humacao, the best route is south of Vieques island. Icacos bay, south of Puerto Humacao, lies between Candeleros point on the north and Icacos point on the south. Near the latter is a small rocky cay of the same name.

Puerto Yabucoa. Puerto Yabucoa lies between point Guallanes, a little south of point Icacos, and point Yeguas, farther to the southward. The town of Yabucoa is about 2 miles inland on a branch of the river Guallanes, which empties into the northern part of Yabucoa bay.

Puerto Maunabo. Cape Mala Pascua, the SE. point of the island of Puerto Rico, is also the S. point of a little bay called Puerto Maunabo, the N. point of which is point Luna. Maunabo river empties into the bay, and the town is on its bank, 2 miles inland.

General directions. The sea on the E. coast of Puerto Rico is generally smooth, so that vessels may lie comfortably in the anchorages just described. On leaving them, time will be saved by passing out through the Barriles or Hermanos passage instead of running round the west end of Puerto Rico and out through the Mona passage. Being off the SE. coast of Puerto Rico and near the entrance to the channel formed by it and Arenas banks, when standing toward the Lima bank, the west point of Bahia Honda should not be brought eastward of NNE. $\frac{1}{2}$ E. When approaching the N. end of the Arenas reef, in standing to the southward do not open out cape Mala Pascua off Naranjo point. When el Yunque or Anvil peak is shut in with the hill on the W. point of Bahia Honda a vessel will be to the eastward of the Arenas reef, and the southern boards may be prolonged.

Do not, however, bring cape Mala Pascua to the westward of SW. by W. $\frac{3}{4}$ W., which will avoid the Musquito, Corona, and Caballo Blanco banks, which lie off the N. shore of Vieques, in the neighborhood of port Mula, and on which the sea does not always break. In standing to the northward, go no farther than to bring West mountain, St. Thomas, in one with Soldier point, Culebra, E. by N. $\frac{1}{4}$ N. until to windward of the South Chinchoros bank, which

lies with the S. point of Palominos, in one with the westernmost Piraguas. When the latter is in one with Zancudo islet NW. $\frac{1}{2}$ W., a vessel will be to the eastward of the Chinchoras and eastward of the narrowest and most dangerous part of this channel, and may then work to windward without fear.

When sufficiently far to the eastward, a vessel may pass out through the channel between the Barriles and Hermanos islets, which is 2 miles wide, and NNE. $4\frac{1}{2}$ miles from the easternmost Piraguas; or between Icacos, Cucaracha, (the westernmost of the Cordillera,) and San Juan head, according as the wind may be to the northward or southward of E. The last being the westernmost, she may proceed through it as soon as she has rounded the eastern Piraguas, which, however, must be given a wide berth.

With the wind from the NE. a vessel may beat through in a day and a half, and from the SE. may run through in half a day.

With a pilot it may be accomplished in much less time, as follows:

Having cleared the N. extreme of Arenas bank, steer to the northward, so as to pass between the western Lavanderas and the Little Piñero, or between the Lavanderas, on which the sea always breaks. Steer E. or W. of the Largo bank, and thence W. of Palominos, and through the channel by San Juan head; but to do this the wind should be to the southward of E. In passing between the Little Piñero and the western Lavanderas, bring the outer extremity of San Juan head on a N. by W. $\frac{1}{2}$ W. bearing, which course will lead to the westward of Largo bank and close up to the head. In taking this route the position assigned to the doubtful Descubridor bank, said to be S. $1\frac{1}{4}$ miles from the western Lavandera and about the same distance from Little Piñero, should be carefully avoided.

These directions, however imperfect, will serve to point out the most prominent dangers, and at the same time warn strangers not to get entangled among them without the assistance of a pilot.

The tides on the eastern coast of Puerto Rico run with great strength to the NE. 7 hours, and to the SE. 5 hours. The N. coast of Puerto Rico runs in nearly a

Tides.

North coast.

straight line E. and W. Toward the eastern end it is mountainous, and is rugged and broken throughout its extent.

Between San Juan head and the harbor of San Juan there appears to be no shelter whatever.

This part of the coast is very little known. It is bordered by a reef within which are many cays and rocks, and on which the sea breaks with great violence. It should not therefore be approached nearer than 4 miles.

Rock.

A small sunken rock, with 14 feet of water on it and 5 fathoms close to, is said to lie 20 miles E. of Puerto San Juan and 3 miles off shore.

Puerto de San Juan.

About 30 miles W. of San Juan head is the harbor and city of San Juan. The city is well laid out and is one of the healthiest cities in the West Indies. It is situated on Morro island, which forms the N. side of the harbor, and is separated from the mainland by a narrow creek, called the channel of San Antonio.

The city is almost hidden from seaward by the high land of the northern shore.

The E. and S. sides of the harbor are low, swampy, and covered with mangrove-trees.

The W. side of the entrance is formed by the Cabra and Cabritas islets and the reefs which connect them with the shore. The Cabra and Cabritas consist of four small islets and two small detached rocks close off their E. end, the nearest of which lies 4 cables westward of the Morro point, at the entrance of the harbor. On the southernmost islet, called Cañuelo—which is the nearest to Puerto Rico, and nearly a quarter of a mile from the largest islet—there is a fort which commands the entrance. Between the Morro and the Cabras the channel into the port is barred, and with strong northerly winds it breaks and becomes dangerous, although there is a depth of from $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms.

Light.

From a new iron tower situated on the upper battery of the Morro castle a fixed *white* light is shown, with every minute a bright flash of about five seconds' duration. The light is 171 feet above the sea, and should be seen in clear weather at a distance of 18 miles. The new tower is octagonal, and is painted dark gray and white, and is situated N. 27° $30'$ E., 120 yards from the old light-tower.

The illuminating apparatus is catadioptric, of the third order.

Off Morro island, at the eastern point of entrance, the ground is foul for about 200 yards; the eastern side of the channel being marked by a conical bell-buoy, moored in 17 feet of water, on the edge of the bank called St. Helena shoal. The western side of the channel has also been marked by buoys, but they cannot be depended upon.

St. Augustine shoal also makes out from Morro island to about 200 yards from the shore, nearly abreast of San Juan gate. Its edge is marked by a wooden post, in which is fixed a perpendicular iron bar, surmounted by a triangular piece of sheet-iron.

A low, dry sand-bank, called the Puntilla, extends out a quarter of a mile to the southward from the SW. end of the walls of the city, and beyond that again a shallow spit, named Puntilla shoal, nearly 400 yards in the same direction, which terminates the shallow ground running along the east side of the channel. Between this shallow ground and that forming the Tablazo shoal westward it is only about 300 yards across, with from $3\frac{1}{2}$ to 7 fathoms water; the weather side being the deepest. The southern extreme of the Puntilla shoal is marked by a wooden beacon similar to the one on St. Augustine shoal, except that it is surmounted by a reflecting glass globe. This beacon is planted in 12 feet of water.

Nearly on a line between the St. Augustine and the Puntilla beacons is a wooden beacon to mark the outer edge of the Alfañique shoal. It is also planted in 12 feet of water.

The Tablazo shoal is on the S. side of the channel, directly S. from the St. Augustine shoal, and is marked by a black and white buoy, moored in 15 feet of water.

Vessels of large draught, or those intending to make but a short stay, will find the most convenient anchorage between the St. Augustine and Tablazo shoals, abreast of St. John's gate.

To the eastward of the Puntilla sand-spit is the inner harbor, a deep bight, sheltered from all winds. The inner channel is marked on each side by posts, with small white tin flags on them denoting the depth of water; in stand-

Puntilla shoal.

Alfañique beacon.

Tablazo shoal.

Anchorage.

Inner harbor.

ing in, those marked with *black* figures are to be left on the port hand, those in *red* figures on the starboard hand.

The inner harbor has, it is stated by various authorities, filled up considerably of late years, and there is probably less water there than is marked on the charts.

There is a line of buoys for mooring and warping, extending the length of the harbor.*

For a steamer, and with the buoys and beacons, as just described, in place, the entrance to Puerto San Juan presents no difficulties. It must be remembered, however, that with fresh northerly winds the sea frequently breaks on the bar at the entrance, and good headway must be kept, in order that the vessel may mind her helm readily.

Directions.

If any of the buoys are out of place, the chart will be the best guide. Pilots are always in readiness to board vessels off the entrance. Vessels entering the harbor under sail should have a hawser and boat ready, and should be prepared to reduce sail as quickly as possible.

In the outer harbor ships should moor with an open hawse to the NW. In the inner harbor anchors should be laid out N. and S.

Tides.

It is high water, full and change, at Puerto San Juan at 8^h 2^m, and the rise and fall is about 1½ feet. Coal and supplies of all kinds can generally be procured here.

Tortuguero.

Tortuguero is a small town on the shore, about 20 miles W. of Puerto San Juan. No safe directions can be given for this part of the coast, but it should not be approached nearer than 3 miles.

Puerto Arecibo.

From Puerto San Juan the N. side of the island may be coasted to the westward without danger at a distance of 4 miles. The town of Arecibo, lying 12 miles W. of Tortuguero and 24 miles E. of the NW. point of the island, has considerable commercial importance. The harbor is formed by a small bay sheltered to the northward by reefs. In the winter season it is only safe for small craft that can get inside the reef.

Arecibo.

Large vessels must anchor outside and be prepared to slip

* In 1876 many of the warping buoys were not in place and the beacons and buoys generally were in bad order. They must not, therefore, be depended upon. This warning is the more necessary as vessels are seldom boarded by a pilot till within the harbor entrance.

and go to sea at once if the wind threatens to blow from N. or W. In the months of April, May, June, and July vessels of moderate draught may anchor close in to the reef. The anchorage is generally rough and uncomfortable.

The town stands on the western side of the bay and is protected by a circular fort to the eastward of it, and about 1 mile to windward of the town a tower and signal-post will be seen on a steep hill. Near the centre of the reef is the cut or channel for small vessels, and at the E. end, between it and the cliff, there is a passage for boats.

There is a rivulet of excellent water, deep enough to admit launches, at the NE. end of the bay, near the town of Arecibo. Water.

From Arecibo to point Peña Agujereada a low sandy beach runs along the coast; but at this point a rocky bluff begins, trending to the SW. for 1 mile to Bruquen point. Bruquen point.
From here to Peñas Blancas the coast is low and sandy. Peñas Blancas.
Peñas Blancas is covered with trees, and from it a reef stretches off to the distance of 1 mile. Bruquen point may be given a berth of 1 mile, where the depth will be from 20 to 25 fathoms.

From Peñas Blancas to point San Francisco, 8 miles to the southward, the coast forms a deep bay called Puerto Aguadilla. Puerto Aguadilla.

On the northern shore of this bay is the town of San Carlos de Aguadilla, on the banks of the river from which it takes its name.

Toward the southern part of the bay is the village of San Francisco. San Francisco.

The town of San Carlos is an excellent place to obtain water and all kinds of refreshments. San Carlos.

Vessels of any size may anchor here with ordinary wind, but during the winter months a heavy swell rolls into the bay. The only dangers are the reef off Peñas Blancas and the sand-bars at the mouths of the small streams, which extend off about 400 yards.

A narrow bank of soundings, about $\frac{1}{4}$ of a mile wide and very steep-to, skirts the shore. In anchoring, be careful not to do so too near the edge of the bank, as a vessel is liable to drag off. In the winter-time it would be prudent

to be prepared to go to sea at once upon any indication of a shift of wind to the N. or NW.

Anchorage. A good berth will be found with the church in the town of San Carlos bearing E. $\frac{1}{2}$ S. and the N. point of the bay N. by W. in 18 fathoms, about $\frac{1}{2}$ a mile from the shore. In approaching Aguadilla bay from the southward care must be taken to keep Jigüero point, the W. extreme of Puerto Rico, to the eastward of N. by E. to avoid the foul ground, which extends as far to the southward as the SW. point of the island.

Rincon bay. Between Jigüero point on the N. and Cadena point on the S., $3\frac{1}{2}$ miles apart, the coast forms a bight called Rincon bay. The bottom is foul and affords no good anchorage.

Añasco bay. Añasco bay lies between Cadena point on the N. and Algarroba point 6 miles to the southeastward.

The river Añasco empties into the bay and has caused a shallow bar to form, extending $\frac{1}{2}$ a mile off shore. Outside this there is good anchorage, with ordinary winds, for vessels of any size.

Mayagüez bay. Mayagüez bay lies between Algarrobo point on the N. and Guanajibo point on the S., and is about 4 miles wide and $1\frac{1}{2}$ miles deep. It affords good anchorage for vessels of moderate size.

From Algarrobo point (which may be known by a house with a red roof, built upon high piles, on the hill, just above the point) the coast of the bay trends to the SE. for $1\frac{1}{4}$ miles to Puntilla, or Little Algarrobo, a low sandy point on which there is a sugar-factory with a chimney and some blue buildings around it. The shore between is foul for 3 cables off, and SW. $\frac{1}{2}$ a mile from Algarrobo point lies the bank of that name, which at the outer part is nearly dry and steep-to.

At about a third of a mile southward of Puntilla, at the head of the bay, is the entrance to the river Mayagüez, in which small coasters lay up for the hurricane season, and before it is the best anchorage, sheltered from the northward round by E. to SW., and good holding-ground. Thence the low shore bends round to the SW., with shallow water some distance off, and N. $1\frac{1}{2}$ miles from Guanajibo point a spit runs off nearly a mile from the shore:

To the eastward of the bay the land becomes elevated, and E. by S. $\frac{1}{2}$ S. about 9 miles from the Puntilla, and a little to the northward of the paps or hummocks of Cerro Gordo there is a remarkable peak called the Cerro Montuoso, which is distinguished by its summit being crowned with two large trees, that give it the appearance of a double peak, and is a useful object from the offing. The village of Mayagüez, lying nearly 1 mile to the ESE. of the entrance of the river, is a place of considerable commercial importance.

The approach to the anchorage is obstructed by a line of banks or shoals directly across the entrance.

The northern and outermost of these is called La Mancha La Mancha de Fuera. de Fuera; lies WNW. $2\frac{1}{2}$ miles from Algarrobo point. It is $\frac{1}{2}$ a mile long NNW. and SSE., and has from 2 to 4 fathoms of water on it, which sometimes breaks. The discolored water on it may be seen at a short distance.

La Mancha de Tierra is $\frac{1}{2}$ a mile in extent NW. and SE., La Mancha de Tierra. and has $1\frac{3}{4}$ to 3 fathoms of water on it.

It lies $\frac{3}{4}$ of a mile SE. of la Mancha de Fuera and $1\frac{3}{4}$ miles W. $\frac{1}{2}$ N. from Algarrobo point.

Between this shoal and the reef on Algarrobo point there is a clear channel 1 mile wide, with a depth of 7 fathoms. On the S. point of this shoal, in $3\frac{3}{4}$ fathoms of water, a cask-shaped iron buoy has been placed. Buoy.

The Allart shoal, (also called Los Machos), between which and La Mancha de Tierra lies the most frequented channel of approach to Mayagüez, is SW. by W. $\frac{1}{2}$ W. 2 miles from Algarrobo point. It is $\frac{3}{4}$ of a mile in length N. and S. and $\frac{1}{2}$ a mile wide. Allart shoal or Los Machos.

On the extreme northern point of this shoal an iron cask-shaped buoy has been placed in $2\frac{3}{4}$ fathoms of water. Buoy.

The next shoal to the southward is the Rodriguez bank, Rodriguez bank. lying about $1\frac{1}{2}$ miles to the southward of the Allart, just without the line of the bay, and N. by W. $1\frac{1}{2}$ miles from Guanajibo point. It is about $\frac{1}{2}$ a mile in extent N. and S., and dry in several places. Between it and Guanajibo point there are $4\frac{1}{2}$ fathoms water, which gradually decreases to the shore. Between the Rodriguez and the Allart there is a bar with 13 to 16 feet of water over it.

Pierre Blanche is a small patch with 1 fathom on it, lying

just within the line of the Allart and Rodriguez shoals, at about an equal distance from each. It obstructs the passage between these banks, and lies W. $\frac{3}{4}$ S. 2 miles from the custom-house, and W. by S. $\frac{2}{3}$ S. from Puntilla.

Lights.

Red leading-lights are shown from the mole-head.

In 1876 the French mail steamer *Guadeloupe* ran aground while entering Mayagüez bay. The following bearings were taken while the vessel was aground: Jiguero point N. 20° W.; Desecheo island N. 60° W. No information has been received as to the vessel's draught, or as to the depth of water on the bank.

For a steamer, or for a sailing-vessel with a fair wind, the best course will be found by bringing Montuoso peak over the custom-house, bearing E. by S. $\frac{1}{2}$ S.

Montuoso peak.

Montuoso peak is of conical shape, and lies 11 miles E. of Guanajibo point, and may be recognized by two trees which crown its summit. In the same line will be seen the church with two towers. The custom-house is near the water's edge, and is the most southerly of four large houses with flat roofs, lying close together. The church on with Montuoso peak also leads over the bar of the Mayagüez river, in 12 feet of water. If the buoys are in place a vessel has only to steer in midway between them.

Directions.

In beating in, a vessel may stand toward la Mancha de Tierra until the custom-house and church are in one; but to the southward, towards the Allart shoal, she must tack before the peak of Montuoso comes in line with the church, until within the two shoals. When the land to the southward of Guanajibo point is shut in with that point bearing S. a vessel will be eastward of the outer banks. In coming from the northward the channel may be taken between las Manchachas and the Algarrobo reef. In this case take care not to haul in round Algarrobo point until the peak of Montuoso opens south of the chimney of Vigo's sugar-house, which is white, and a conspicuous object near the shore, N. of the Puntilla battery.

With a large vessel it is advisable to take a pilot.

There is said to be good anchorage to the westward of the Mayagüez banks, but in the absence of trustworthy information of the neighborhood it should be approached with caution.

The tide rises and falls in Mayagüez bay from 2 to 3 feet, but no exact determination of the time of high and low water has been made. The periods are said to be irregular. Tides.

From Puerto Mayagüez to the SW. point of the island called Cabo Rojo the coast is very foul.

The harbor of Puerto Real de Cabo Rojo lies $5\frac{1}{2}$ miles S. from point Guanajibo. It is a nearly circular basin $\frac{3}{4}$ of a mile wide E. and W. Puerto Real.

In the entrance there are 18 and in the middle of the harbor there are 16 feet of water.

The channel is very narrow and lies on the southern side of the entrance. From the N. point an extensive reef runs out, which, after skirting Fanduco cay, ends just to the northward of Varas point.

The approaches to the southern part of the W. coast of Puerto Rico are rendered dangerous from the want of definite knowledge as to the positions of the various off-lying rocks and shoals.

Guaniquilla point lies 2 miles S. by W. $\frac{3}{4}$ W. from Puerto Real; between it and point Melones, $2\frac{1}{2}$ miles farther on, is Boqueron bay. It is obstructed by shoals within and without, affords no safe anchorage, and is difficult of approach. Boqueron bay.

The dangers off the SW. coast, so far as known, and their approximate positions, are as follows:

Negro rock is small and the sea nearly always breaks on it. It bears S. $\frac{1}{2}$ E. from Jiguero point, and W. by S. from Guanajibo point, distant $3\frac{1}{2}$ miles. Negro rock.

Media Luna shoal is said to be a reef $\frac{2}{3}$ of a mile long N. and S. and about 400 yards wide. The sea sometimes breaks upon it. From its N. end Guanajibo point is said to bear NE. by E. $\frac{1}{2}$ E. and Jiguero point N. $\frac{1}{2}$ E.; $\frac{1}{2}$ a mile E. of it are said to be three rocks on which the sea breaks constantly, but the existence of both shoal and rocks is very doubtful. Capt. J. V. Baker, R. N., sought in vain for them in H. M. S. Arachne, and asserts positively that these dangers do not exist in this position. He says, "On one particular spot, cape Rojo bearing SE. by E. 8 or 9 miles, we always found a cross and heavy swell in 18 or 20 fathoms; this may arise from irregularity of ground, but it was certainly very singular, as the water around was smooth." Media Luna shoal.

Las Coronas.

Las Coronas are sand-banks $\frac{1}{2}$ a mile in extent and just awash, on which the sea generally breaks.

They lie to the southward of the Negro rock, with Guanajibo point bearing NE. $\frac{1}{2}$ N. and Jiguero point bearing N. $\frac{1}{2}$ W. $3\frac{1}{2}$ miles off shore.

Guaniquilla shoal.

Guaniquilla shoal is not marked on the Spanish chart, but is said to lie 2 miles W. of Guaniquilla point. It is a rocky ledge 400 yards in extent, with 16 feet of water on it. From it Guanajibo point bears NNE. and Jiguero point N. $\frac{1}{2}$ W.

Gallardo bank.

The Gallardo bank is also a rocky ledge, which lies nearly W. $6\frac{1}{2}$ miles from Melones point. It is 600 yards in extent, and has 16 feet of water on it. It bears from Desecheo island S. by E. $\frac{1}{4}$ E., from mount Atalaya SSW., and NW. by W. $\frac{3}{4}$ W. from the southern extreme of the Morrillos, which are remarkable little hills near cape Rojo. These bearings, believed to be correct, do not quite agree with the position of the shoal on the Spanish chart of 1842.

Mount Atalaya is the highest and northernmost of two peaks at the western extreme of the chain of mountains which run from E. to W. in the NW. part of the island. It has a noticeable appearance and forms an excellent landmark.

Cape Rojo.

Cape Rojo, the SW. point of Puerto Rico, is a bold bluff sloping down from a hill with two peaks. Seen from the E. or W. it has the appearance of two small islands close to high land. When seen from the southward two remarkable bluffs are seen to the eastward of it.

A bank of white sand and coral, on which there are large quantities of fish, extends 8 or 9 miles from the cape, with from 6 to 15 fathoms of water on it. The edge of the bank is steep to, and the bottom may be seen in 12 or 13 fathoms.

South coast.

The S. coast of Porto Rico from a distance appears high and bold, but on a nearer approach the shore is seen to be low and covered with mangrove-trees.

The shore is lined with cays, reefs, and shoals only known well to the coasters and fishermen, and it should not, therefore, be approached nearer than 4 miles.

Sixteen rivers empty into the sea in this part of the island, but few of them are navigable even for boats. In some places soundings extend a considerable distance off shore.

There are many small harbors and anchorages within the reefs only known to the coasters and fishermen. There are but few ports frequented by larger vessels.

The best one of these and the first, proceeding easterly from cape Rojo, is Puerto Guanica. The entrance to the bar lies in the middle of the bight between point Brea, a bold and rocky cliff on the W., and point Picua on the eastern side, and is formed by two bold headlands, Meseta point on the E. and Pescadores point on the W. Puerto Guanica.

The shore of the bay on both sides of the entrance is skirted by a reef. On the eastern side it curves outward from Meseta point to the Cana Gorda islets off point Picua, and on the western shore runs from point Pescadores to the shore at a short distance N. of point Brea. Outside of the reef there is a rocky patch with 12 feet of water on it. It is 600 yards long N. and S., but very narrow, and lies SSE. 1 mile from Meseta point and on a line between Brea and Picua points.

In approaching Puerto Guanica from the eastward bring Meseta point on with the eastern pap of the Cerro Gorda, a mark easily recognized. Steer in on this bearing, which will carry a vessel a safe distance from the rocky ledge above mentioned.

As soon as the islet of Cana Gorda bears E. this danger will have been passed, and a course may then be shaped for the middle of the entrance. The western pap of Cerro Gorda on with point Meseta leads close to the westward of the rocky ledge. In coming from the westward point Brea may be passed at the distance of 200 yards. Then steer for point Meseta until the middle of the entrance bears N., when stand boldly in and anchor as convenient in from $3\frac{1}{2}$ to 4 fathoms of water. The deepest water is on the western side.

Seven miles E. of Puerto Guanica is Guayanilla bay, open to the southward, and lying between point Majagua on the W. side and point Guayanilla on the E. Guayanilla bay. Near the latter point are several islets. Majagua point is surrounded by reefs. Guayanilla river empties into the bay.

Puerto de Matanza is a similar bay, also open to the southward, and lies between Guayanilla point on the W. Puerto de Matanza.

and point Cuchara on the E. The river Peñuelos empties into this bay.

Ratones island. SW. by W. from point Cuchara, at the distance of 1 mile, is a small island, called Ratones, which serves as a mark by which to recognize Puerto de Matanza and Puerto Ponce, lying to the eastward of point Cuchara.

Puerto Ponce. Puerto Ponce* is 15 miles eastward of Guanica, and north-westward 7 miles of Muertos island. The bay of Ponce is nearly 3 miles across between Cucharos the western and Carenero the eastern points; the port is in the NE. corner of the bay, and on its shore is the village of port Ponce, containing 1,500 inhabitants. The custom-house, a long, white, two-storied building, with flat roof and flag-staff, is the most prominent object in the village, and is very conspicuous from seaward. The shores are low and bounded by mangrove and cocoa-nut trees, but 2 or 3 miles westward of Cucharos point the land rises and becomes hilly. Ratones island, lying 1 mile SW. of Cucharos point, is about 600 yards long and 200 yards wide, low and covered with brush-wood; its surrounding reef, which nearly dries at low water, stretches off southeastward for 600 yards. Arenas cay, small and bushy, is between Ratones and Cucharos point. Cardones island, 1,800 yards WSW. of Gatas islets off the E. point of the bay, is low, covered with brush-wood, and in its centre is a wooden house; the reef surrounds the island to the distance of nearly 400 yards, and with that from Gatas islets narrows the channel to nearly $\frac{1}{2}$ a mile. Cayito reef is a dangerous coral bank which seldom breaks, lying $\frac{1}{2}$ a mile northward of Cardones island; there are 9 feet on its eastern edge, and probably shoaler water will be found; a white chimney open eastward of the negro huts, near the cocoa-nut grove on the N. side of the bay, bearing N., clears the E. side of the bank. There is a 7-fathom channel between Cardones island and Cayito reef, but it should not be taken without a pilot. The Gatas, four small, low cays off Carenero, appear as a continuation of that point; its projecting reef, upon which the sea breaks, is steep-to. At the extremity of the reef off Peñoncillo point northward of Carenero, are two small rocks which uncover

* Nav. Lieut. G. H. Shorte, R. N., H. M. S. *Druid*.

4 feet at low water. Cabrillon point lies about $\frac{3}{4}$ of a mile eastward of Carenero point; two small islets or cays lie off it.

The town of Ponce, the second in size, third in commercial importance in the island, and numbering 14,000 inhabitants, lies 3 miles ENE. of the port.

The law holds the masters of vessels responsible and liable to fines for any false declaration in contents, quantity, weight, or measure.

The supply of coal and wood is uncertain. Water is scarce and bad.

Shoal and uneven soundings exist southward of the bay for some distance from the shore, probably on irregular banks extending from Ratones island on the westward, and from Muertos island on the eastward, leaving a deep channel between them into the port, eastward of Cardones island. Approaching from the westward, the custom-house open of the E. end of Cardones island bearing NNE. $\frac{1}{2}$ E. crosses the bank in $5\frac{1}{2}$ fathoms, and, on nearing Cardones, open the custom-house to N. by E. $\frac{1}{2}$ E. From eastward, round Hammock cay, off the SW. end of Muertos island, at the distance of $\frac{3}{4}$ of a mile and steer NW. by W. $\frac{1}{4}$ W.; on nearing the port the shipping and upper part of the custom-house will be seen over the low mangrove-trees, and small vessels may cross in 4 fathoms water, with the custom-house in line with the W. end of Gatas islets. The custom-house, in line with the saddle in the first range of hills behind it bearing N. by E. $\frac{1}{4}$ E., leads over 7 fathoms. Large ships should bring the custom-house to bear N. by E. $\frac{1}{4}$ E., on which bearing the least water will be 13 fathoms, and when abreast of Gatas steer N. to the anchorage. The edge of the bank is $1\frac{1}{2}$ miles southward of Cardones island. Pilots can always be obtained, but they only board vessels when off Cardones.

Directions.

The land-breeze often sets out between sunset and sunrise.

It is high water, full and change, in Ponce harbor at 2^h 0^m (approx.) and the rise 2 feet, but the tides are very irregular.

Tides.

Muertos or Dead Chest island lies 4 miles off the S. coast of Puerto Rico and nearly midway between the SW. and SE. points of the island. The southern part of the island is

Muertos or
Dead Chest is-
land.

high and rocky, sloping toward the N., and from a distance looks like a separate island. The island is nearly connected to the S. coast of Puerto Rico by a reef extending from its NE. point, on which the sea generally breaks heavily. This reef seems to skirt the E. and S. sides of the island. In the latter direction it extends $\frac{1}{2}$ a mile off shore. At about 200 yards' distance from the SW. end of the island there is a small, flat rock, called the Hammock, with a dry reef between them.

The Hammock should not be rounded nearer than $1\frac{1}{2}$ miles.

Water can be obtained on Dead Chest island by digging wells a little above high-water mark.

Turtles are plenty in the proper season, and the neighboring banks abound with fish.

The western side of the island is clear and affords good anchorage in from 7 to 12 fathoms of water. A good berth is with the SE. point of Hammock rock bearing SW., the only bay having a sandy beach, S. by E. and the NW. point of the island bearing E. A vessel may also anchor with the W. point of Hammock rock SE. by S. $\frac{1}{2}$ S. $1\frac{1}{2}$ miles distant, and the N. point of the island NE. $\frac{1}{2}$ E.

The Berberia cays are two rocks lying 3 miles ENE. of Muertos island. In their neighborhood are several dangerous shoals, very imperfectly known. With the island bearing west, distant 3 or 4 miles, the depth is 6 fathoms.

Great caution must be observed by the navigator in this vicinity.

Puerto Jacagua. Puerto Jacagua is situated at the mouth of the small river of the same name, 3 miles E. of point Cabullon. To the westward of the mouth of the river are two small cays, called the Frios. This port it is said is easy of access, but we can give no exact directions. As the soundings diminish regularly from $6\frac{1}{2}$ to $3\frac{1}{2}$ fathoms, in approaching the shore here, the lead will be a good guide.

Boca Chica. Boca Chica is a small trading place $4\frac{1}{2}$ miles N. of Muertos island, and the approach to it is said to be clear of danger. As in the case of Jacagua, the soundings should be carefully attended to.

Puerto Pastillo. Puerto Pastillo lies 3 miles to the eastward of Boca Chica and immediately to the westward of Coamo point.

Coamo bay lies between Coamo point on the westward and point Petrona on the eastward. Its shore is skirted by reefs throughout its length. The river Coamo empties into the bay. Coamo bay.

Near Coamo bay are several small cays, and 2 miles to the southward are the Berberia cays, with dangerous banks near them.

The first port of any commercial importance to the eastward of Muertos island is Puerto de los Salinas de Coamo, well sheltered by reefs and lying between point Fanna on the W. and point Arenas on the E. Puerto de los Salinas de Coamo.

The entrance may be easily distinguished by several cays lying near point Arenas and a guard-house about 4 miles to the northward of the western cay. The channel lies between this western cay and a reef $1\frac{1}{2}$ miles west of it on which the sea always breaks.

Coming from the eastward, after bringing cape Mala-Pascua to bear N. distant 4 miles, the course for the entrance will be W. $\frac{1}{2}$ S., which will carry a vessel outside all the cays lying along shore.

Steer boldly in between the outer or westernmost of the cays lying off point Arenas and the reef $1\frac{1}{2}$ miles to the westward, passing the cay at a distance of 200 yards. Stand in toward the guard-house and anchor with it bearing N. $\frac{1}{2}$ E., about 1 mile distant, in 4 or 5 fathoms of water.

Discolored water extends for some distance to the southward of the cays. Three miles off shore the depth is 10 fathoms, decreasing to 7 fathoms as the coast is approached.

Within the harbor is a rocky shoal, with $16\frac{1}{2}$ feet on it, with 22 feet all around. It lies with the middle of the round cay, at the entrance of the channel between the coast and the islets, bearing NNE. $\frac{1}{4}$ E. and Saso cay SW. $\frac{1}{3}$ S. Nina shoal.

In leaving this harbor a vessel should, if bound to the westward, stand to the southward until Muertos island bears to the northward of W. before keeping away.

At the head of the bay, between Arenas and Colchones points, is Puerto de Aguirre. No exact information can be given for this port or for the large bay in which it lies. Puerto de Aguirre.

Five and a half miles to the eastward of Puerto de los de Infierno, the entrance to which lies between point Col-Salinos de Coamo is Puerto de Jobos, also called the Boca Puerto de Jobos or Boca de Infierno.

chones on the W. and point Pozuelo on the E. The eastern part of this bay, which appears quite spacious, is sheltered to the southward by a long peninsula. No trustworthy information is attainable with regard to this port. Several small streams from the hills inland lose themselves in the swamp at the head of the bay, none of them emptying directly into the sea. To the eastward of this port there are several bays, but there is no secure anchorage.

Guayama.

The port of Guayama is entirely open to the southward, but affords good anchorage, with the ordinary trade-winds. It lies 1.2 miles W. of cape Mala-Pascua, and can be recognized from the offing by a guard-house on the shore bearing N. by E. from the end of the reef which shelters the anchorage to the eastward, and a windmill on a hill 1 mile to the westward. The reef to the westward of the anchorage extends from 3 to 4 miles off shore.

In approaching Guayama from the eastward, cape Mala-Pascua should be passed at a distance of 4 miles, and as soon as it bears to the eastward of N. the Guayama reef may be seen from aloft.

Between cape Mala-Pascua and Guayama the coast may be approached within 4 miles, when a depth of from 7 to 10 fathoms will be found. As the anchorage is approached the soundings become irregular, varying from 5 to 8 fathoms until within the reef, when they gradually decrease as the shore is neared. One mile outside the reef, to the southward, there are 13 fathoms of water.

Pass well outside the reef until the guard-house bears N. by E., when haul in directly for it, anchoring with it on this bearing, in a berth 1 mile off shore, with 4 fathoms of water and the W. end of the reef S. by E. In leaving Guayama, bound to the westward, stand well off shore before keeping away, to avoid the reefs to the westward of the port.

Puerto de Arroyo.

Arroyo is a small bay 3 miles northeasterly from Guayama and immediately to the westward of point Figura. It can easily be recognized by the village of Arroyo, lying 3 or 4 miles inland and visible 12 or 15 miles. There is a white church on a little hill above the village, having on its

western end a square tower and a cupola on the eastern end.

The anchorage may also be recognized by the custom-house, a large yellow building. To enter the port bring the custom-house to bear N. by W. and steer in on this course to avoid a bank, with $3\frac{1}{2}$ fathoms of water on it, lying 3 miles S. of the bay. This bank is a spit running off from the eastern reef, and will be cleared by keeping the middle of the village of Arroyo bearing NNE. A good berth is $\frac{3}{4}$ of a mile off shore, with the custom-house bearing N. This anchorage is not at all well sheltered, and a constant SE. swell is felt.

The bay of Patillas lies between point Fijura on the W. Puerto Patillas. and point Vientos on the E. No accurate information can be given with regard to it, but it is believed to be obstructed by reefs.

The Guayama reef skirts the shore from cape Mala-Pas- Guayama reef. cua westwardly about 13 miles to the meridian of Guayama.

Its outside edge is at an average distance of $3\frac{1}{2}$ miles from the shore. It is divided into three parts, the eastern being named Ola Grande, the middle Algarrobo, and the western Media Luna.

The winds on the coast of Porto Rico present the same general characteristics as those of the Virgin islands. There is no land-breeze to be depended upon, though in shore the trade-wind dies away during the night. On the W. coast the wind in the day-time is apt to draw toward the land. Winds.

In the winter fresh gales from N. and NW. occur, and in the summer long calms and light SE. airs prevail, with hard squalls and heavy rains, especially on the S. side.

Rollers, though not so heavy as at the Virgin islands, strike the northern coast with violence.

On the N. side of Puerto Rico the current is said to incline generally to the SW. or toward the shore, and to run with greater velocity in the winter than in the summer months. On the S. side its course is generally W., but its movements are here uncertain. Some navigators state that at the full and change of the moon, a strong weatherly set will occasionally be found, especially if light winds or Currents.

northers have prevailed near these periods, consequently giving great assistance to vessels beating to windward. In the summer-months it will incline to the NW. toward the shore, and round the SW. end into the Mona passage, with great force. This is probably owing to the great body of water thrown out in this direction, at this period, from the great rivers of Terra Firma.*

* Sir R. Schomburgh, 1850.

CHAPTER IX.

THE VIRGIN ISLANDS.

Variation in 1876 :

Anegada, $0^{\circ} 0'$ | Culebra, $0^{\circ} 20'$ E.

The Virgin islands were discovered by Columbus on his second voyage, in 1494. For some time they were chiefly in the hands of the buccaniers, but in 1666 Tortola, Virgin Gorda, and Anegada came into the possession of the English, and in 1672 the Danes colonized St. Thomas and St. Johns. The first settlers at Santa Cruz or Saint Croix were the Dutch, in 1643; but it afterward passed successively into the hands of the English, Spaniards, and French; and in 1733 it was sold by the latter to the Danes, who still possess it, and is the seat of government of the Danish islands. The third portion, (sometimes called the Passage islands,) which includes Culebra, Bieques or Crab island, and the small islets between them and Puerto Rico, have not yet been regularly settled.

The line of demarcation between the English and Danish islands runs from the N. between Little Tobago and Hans-Lollik; from thence to the ESE. midway in the channel between Thatch island, Tortola, and St. John, round the E. end of the latter, and from thence to the S. through the centre of the Flanagan passage.

The majority of the islets which lie off the larger islands are barren and of no value.

The only islands of any commercial importance are Virgin Gorda, Tortola, St. John, St. Thomas, and Santa Cruz.

The island of Anegada only merits description on account of the reefs which surround it, where many vessels have been wrecked.

On making the Virgin islands from the northward, Vir- Aspect.
gin Gorda will be seen on the extreme left, rising in a clear, well-defined peak, 1,370 feet high. Anegada being only 30

feet above the sea, will not be seen more than 5 or 6 miles from an elevation of 10 feet. Next to Virgin Gorda, Tortola will appear the most conspicuous; Sage mountain, the highest in the island, does not rise into a peak from this direction, but appears flattened and elongated; its height is 1,780 feet. Immediately to the right or to the westward of it will be seen the rugged pointed peaks of Jost Van Dyke, 1,070 feet high, and behind them the irregular small peaks rising from the table-land of St. John, and varying in elevation from 800 to 1,270 feet.

If on or near the meridian of $64^{\circ} 50'$ W., and about 20 miles to the northward of the islands, a separation will be observed between St. Johns and St. Thomas, as the small cays which lie off and between them will not be above the horizon, while Virgin Gorda, Tortola, Jost Van Dyke, and St. John will seem to form one large island, the prominent peaks on each being alone distinguishable.

The island of St. Thomas may be recognized by having a large saddle on its centre, formed by Signal hill and West mountain, the former 1,500, the latter 1,550 feet high; and the island is less rugged in outline than the others. The saddle is equally conspicuous from the southward. Culabra, from the above meridian, will be only just in sight. Its hills are more rounded than the others, and much less elevated, being not more than 650 feet high. From hence also, in clear weather, El Yunque or Anvil peak, 3,500 feet high, on the Sierra Luquillo, at the E. end of Puerto Rico, may be seen.

Tides

The phenomena of the tides among the Virgin islands, although of the highest importance to navigators, are extremely difficult of explanation. The following rule is given by the fishermen, and in general it may be safely adopted: From the moon's rising until her meridian passage, the flood runs to the southeastward, or to windward; and from thence to her setting the ebb runs to the northwestward, or to leeward, and *vice versa* with the lower transit; hence there is a six-hours' stream each way. This rule, however, is greatly interfered with in different localities, as will be seen hereafter, and by the force and direction of the wind.

It is observed that the southern tide predominates during the summer-months, from the middle of June to the middle

of August, and two tides have been then known to follow in succession, particularly if the wind has been westerly; and on such occasions the perpendicular rise was increased by 2 feet. Near the commencement of this remarkable change the stream is observed to set for eight or ten days continually to the southward with a force seldom surpassed, and is called by the fishermen St. John's tide, from its occurring near the day of that saint. For the remainder of the above period, the ebb or northerly stream will run only for about one or two hours.

During the months of September, November, March, and April, the northern tide prevails, and with considerable force, being assisted by the current. At this period, also, the highest water is generally in the morning, and there is only a half-tide in the evening; the reverse takes place during the summer-months. The establishment for high water at full and change appears to be about $9^h 0^m$, but it is liable to great uncertainty, for sometimes it is as early as $7^h 0^m$. The rise and fall at springs is from 1 to $1\frac{1}{2}$ feet; but in the months of April and May the mean level of the sea is observed to be a foot lower than at other periods, which agrees with the observations of Dr. Fahlberg. The duration of the stream (as before stated) is six hours each way, and to which the stranger must pay strict attention, leaving the time of high water as a thing altogether of minor importance.

As already observed, the northern stream is called the flood, and that coming from the southward the ebb; strictly, however, this may be an error, although not of much consequence; for the change of set takes place at about half-tide on the shore, and, the rise and fall being so small, it is difficult to say to which set the term "flood" should be applied.

It happens, however, that the commencement of the flood-stream takes place at full and change, at about $6^h 0^m$, and as it runs for six hours and then changes to the ebb, by remembering this establishment for the first beginning of the flood, the turn of tide can of course be calculated for any intermediate day during the lunation.

As $6^h 0^m$ happens to be nearly the time of the moon's rising at full and change, we have the fisherman's rule explained.*

*Rear-Admiral Barnett, R. N.

Soundings.

The Virgin islands lie on the southern edge of an extensive bank of soundings. By an inspection of the chart it will be seen that it stretches off 10 miles to the northward of St. Thomas, and 22 miles in the same direction from Tortola.

On the south side of the group the bank reaches off about 2 miles from Crab island, then trending to the NE., and only extending $1\frac{1}{4}$ miles from Norman island. Northwest of Anegada the bank is said to be extending on account of the loose sand and strong current.

The northern and southern portions of the bank differ very much in their character as well as their extent.

On the south the bank only reaching from 1 to 7 miles from the islands is steep-to, and close within it is a narrow coral reef reaching from Anegada nearly to Crab island, with from 15 to 19 fathoms of water on it. Just within this reef to the northward are depths of from 25 to 30 fathoms, gradually shoaling as the islands are approached.

North of the islands the average depth is from 28 to 30 fathoms, sandy bottom, interspersed with rocky heads or patches from 1 to 4 miles in extent, and having from $6\frac{1}{2}$ to 15 to 20 fathoms on them. These patches lie between the meridians of $64^{\circ} 40'$ and $64^{\circ} 56' W.$, and are from 2 to 7 miles from the edge of the bank.

The most northern of these patches is Whale bank, with 9 fathoms on it.

Turtle head.

The shoalest part is not more than 200 yards in diameter. SW. of the Whale bank is a small rocky head only 20 or 30 fathoms wide, with as little as $6\frac{1}{2}$ fathoms of water on it.

Barracouta banks.

Barracouta banks are about 2 miles from the edge of soundings, and occupy a space $1\frac{1}{2}$ miles long and $\frac{1}{2}$ a mile broad. There are 11 fathoms on the shoalest part of the bank.

Kingfish banks.

The Kingfish banks are two coral patches, each about 1 mile long and $\frac{1}{2}$ a mile wide, with 8 fathoms of water in their shoalest part.

These banks are all correctly laid down on the U. S. Hydrographic Office and English Admiralty charts, and are, with the exception of 2 miles of rocky ground of 18 fathoms, 6 miles NW. of Cricket cay, the only off-lying

banks north of the Virgin islands, between Anegada and Culebra.

Anegada or Drowned island is $9\frac{1}{4}$ miles in length ESE. and WNW., and from 1 to 2 miles in width. It is about 30 feet high, and covered with brush-wood. Anegada island.

Until the establishment of the light-house on Sombrero island, 47 miles E. $\frac{3}{4}$ S. from the east end of Anegada, numerous vessels were wrecked on this island and the dangerous reefs which surround it. Now the landfall sought by vessels from the northward is Sombrero light-house, from which an accurate departure can be taken, making the Anegada channel, once so famous for its dangers, perfectly safe with ordinary care and attention.

The island is skirted by a very dangerous reef, running close in shore on the northern and western sides. From the eastern end of the island the reef reaches off $1\frac{1}{2}$ miles, and thence a broken reef trends off SE. by S. $7\frac{1}{2}$ miles, on which most of the wrecks alluded to have occurred. This portion is called the Horseshoe reef, and from its southern end detached coral rocks and shallow ledges reach off $4\frac{1}{2}$ miles SW. by S., where they terminate in the Herman reefs. Horseshoe reef.

The edge of soundings comes within $2\frac{1}{2}$ miles of the southeastern angle of the Horseshoe reef, and the 10-fathom line is only a mile from it. Abreast the Herman reefs the edge of soundings is only a mile off. Herman reef.

At 2 miles WSW. of the SE. angle of the Horseshoe reef is the White Horse, a heap of dead white coral, 3 feet high. White Horse.

The Robert reef is a small rocky patch, with $4\frac{1}{2}$ fathoms on it, lying $3\frac{1}{2}$ miles W. of the Herman reefs. Robert reef.

Hawk's-bill bank is a small rocky patch having from 3 to $4\frac{1}{2}$ fathoms, lying 2 miles NNW. of the Robert reef. Hawk's-bill bank.

All these patches should be avoided in anchoring to leeward of the Horseshoe reef. This is easily done, as the water is very clear and the bottom easily seen.

After SE. or southerly winds, which blow at times throughout the year, but are most frequent in May or June, a NW. current of sometimes a mile an hour runs along these reefs. For this reason especially vessels bound from the northward through the Anegada passage should not fail to sight, by night or day, Sombrero light-house. Currents.

The edge of soundings is so near the reef that the lead is not a trustworthy warning of the approach to danger, and therefore a sailing-vessel bound to the southward, and having a head wind in this channel, should not approach these reefs nearer than 10 miles, but should work to the southward in the eastern part of the channel till past all danger.

The rollers, or ground-swell, frequently occur from October to May, and continue sometimes three or four days. In general they set in after a prevalence of light E. or SE. winds. Between Tortola and Guano islands they have been seen to top and break in 9 fathoms, and on the SW. side of Anegada, in $4\frac{1}{2}$ fathoms, anchors are sometimes lifted; it is consequently dangerous for sailing-vessels to come too near any part of the northern shores of the Virgin islands, for they get up suddenly, and during their continuance the wind is too light to keep a vessel under command. They appear to have great influence on the bottom in loosening the sand and in discoloring the water for some miles to the northward of the islands, as far as the edge of the bank. In some places near the W. end of Anegada, where the bottom is composed of very fine sand, the formation of the banks is frequently changed.

Anchorage.

The north side reef terminates at the west end of Anegada, about $1\frac{1}{2}$ cables from the shore, but the south side of the island is foul for more than 2 miles off. There is good temporary anchorage off the west end, in from 5 to 6 fathoms water, at about a mile distant. It will not be prudent, however, to remain here any time during the period of the rollers, which frequently occur from October to May; but it will be better during this season to anchor well under the south side of the island, if intending to remain the night.

The best anchorage will be found in 6 fathoms, with the west end bearing N. by W. $\frac{3}{4}$ W. $5\frac{1}{2}$ miles, the cocoa-nut trees at the settlement at Pearl point NE. by N., and the east point E. by N. $\frac{3}{4}$ N. Great care, however, must be taken not to haul up too suddenly after rounding the west end, and not to come within the depth of 5 fathoms; great attention must be paid to the lead after passing within the 10-fathom line.

The bank to the westward of the meridian of Anegada is composed chiefly of fine sand, and in light weather vessels

may anchor on it in safety with a kedge or stream, taking care, however, to avoid the rocky banks already described.

Virgin Gorda, the easternmost of the Virgin islands, is Virgin Gorda. easily distinguished by its rising gradually to a peak 1,370 feet high. It is sometimes called Peniston, or Spanish Town. The inhabitants are few in number, and are principally employed in raising fruit and vegetables and burning charcoal for the markets of St. Thomas and Santa Cruz.

The outline of the island is exceedingly irregular.

From Pajaros point on the east to Mountain point on the west the north side of the island is $5\frac{1}{2}$ miles long, and from the latter point to the south point of the western shore is 5 miles. The centre portion is about 2 miles square, and occupied by the immense hill, the summit of which, named Virgin peak, has been already described. From thence the east end of the island is a narrow strip of land composed of irregular rugged hills, terminating at Pajaros point in a remarkable pinnacle rock, 120 feet above the sea. The southern portion is about a mile in breadth, more regular in outline, from 250 to 450 feet high, and nearly separated from the centre by a small isthmus about a cable across.

The most remarkable feature of Virgin Gorda is on its western side, between Colison point and the south end of the island. The eastern side of this peninsula has been broken up by some violent action of nature into immense granite blocks, which lie scattered about on the shore.

The cays and islets to the southward as far as Round rock, 2 miles distant, are also composed of the same kind of rock, and the largest, (which lies nearly half a mile from the south end of the island,) from its having the appearance of a town in ruins, is named Fallen Jerusalem.

Many of these blocks are 60 to 70 feet square; some are merely confined in their places by the weight of others leaning on them; and many, with deep rents and fissures in their sides, appear ready to fall by the slightest shock. In one or two places the sea finds its way through the crevices and forms beautiful natural baths. It is also a curious circumstance, that similar granite blocks are found scattered about on Beef island, on the opposite side of Sir Francis Drake channel, and nowhere else.

Anchorage. There are two excellent anchorages on the western side of Virgin Gorda.

St. Thomas bay. St. Thomas bay is the southernmost of these, and lies between Colison point and Fallen Jerusalem. On the south side of this bay is the settlement of Spanish Town.

The best berth is with the south point bearing east in 14 fathoms of water, about a mile from the shore. This is the best of the two western anchorages, for a vessel can get under way to the westward with greater ease than from the more northern one.

The shore of St. Thomas bay is lined by a reef extending from a quarter to a half a mile from the shore.

Half a mile off Colison point there is a rock with 13 feet of water on it.

The water is smooth at both anchorages, except at the season of rollers, and the holding-ground good.

The other anchorage, called by Admiral Kerhallet Great harbor, is a large bay lying between Mountain point on the north and Colison point on the south, and is partially sheltered to the NW. by the Seal and Dog islands.

The best berth is with Great Dog island bearing W. about half-way between this island and Virgin Gorda, in about 13 fathoms.

These anchorages can easily be reached from either N. or S.

Tow rock. The islets are all steep-to, and the passages between them clear, except that between Scrub island and the Dog islands, in which lies the Tow rock with 15 feet of water on it. It is only 20 feet in extent and lies a little more than 1 mile W. by N. $\frac{1}{2}$ N. from the West Dog. The best direction to give for clearing it is to keep either Dog island or Scrub island close aboard, as they are steep-to.

Virgin Gorda sound. The anchorage to the northward of the island is called Gorda sound, and is an excellent and capacious harbor. It is $1\frac{3}{4}$ miles long from E. to W. and $\frac{3}{4}$ of a mile broad. It is sheltered from all winds and from the rollers.

Prickly Pear island. The entrance lies between Prickly Pear island on the E. and Musquito island on the W. side, but is much narrowed by the Cactus and Colquhoun reefs making off from the islands on either side toward mid-channel. There are from $4\frac{1}{2}$ to 6 fathoms of water in mid-channel, diminishing to-

ward either side. The mark for entering is to bring a house at the E. end of Spanish Town on with a remarkable tree above it bearing S. $\frac{1}{4}$ W.

This mark would not be easily recognized by a stranger, and a better way would be to anchor a boat on the point of the eastern reef as a buoy.

A good berth is on a line from Gnat point to the S. end of Prickly Pear island, and half-way between them, in from 10 to 12 fathoms of water.

It is high water, full and change, in Gorda sound at 8^h 30^m, and the rise is about $1\frac{1}{2}$ feet. The tides at the entrance of the sound, between the reefs, seldom run more than half a knot, and the flood sets towards Prickly Pear island. Between Mosquito island and Anguila point, S. of it, the flood sets to the eastward at the rate of 1 and $1\frac{1}{2}$ knots. Between Pajaros point and the Horseshoe reef it seldom runs more than a knot, but its duration varies.

Prickly Pear island, on the E. side of the entrance to Gorda sound, is about 1 mile long, $\frac{1}{4}$ of a mile wide, and 230 feet high. Its eastern end is about $\frac{1}{4}$ of a mile from the coast of Virgin Gorda, and between them lies the Saba rock, 25 feet high. From the western end the Cactus reef runs off $1\frac{1}{2}$ cables to the westward.

The N. side is steep-to, and between it and Necker island there is good anchorage in Virgin sound in 7 or 8 fathoms.

Care must be taken to avoid the foul ground S. of Necker island.

Mosquito island is 1 mile to the westward of Prickly Pear island. It is about 250 feet high. Off its N. side are several small rocks, the outer one, Mosquito rock, being 24 feet high. From it the Colquhoun reef extends $\frac{1}{2}$ a mile to the SE.

Northwest by W. about $2\frac{1}{2}$ miles from Pajaros point is Necker island. It is about $\frac{1}{2}$ a mile long and $\frac{1}{4}$ of a mile broad, and toward its N. end is 110 feet high. On its N. side it is bold and steep-to; from the eastern, southern, and western sides reefs stretch out to the distance of nearly $\frac{1}{2}$ a mile, that to the southward having a clear channel $\frac{1}{4}$ of a mile wide between it and the reefs from the islands farther S.

Eustatia island. The island of Eustatia is small and 170 feet high, lying $\frac{3}{4}$ of a mile to the southward of Necker island.

Its N. side is foul to the distance of a cable, and from it a broken reef stretches to Pajaros point.

Inside the reef there is a snug anchorage for small vessels, reached through a narrow cut in the reef $\frac{1}{2}$ a mile E. of the island.

Invisibles. The Invisibles are two small rocks lying $\frac{3}{4}$ of a mile E. by S. $\frac{1}{4}$ S. from the N. point of Necker island. They have only 3 feet of water on them and do not always break. There are from 6 to 11 fathoms all around them.

Dog islands. The Great Dog, George Dog, and West Dog are three rocky islets lying about $1\frac{1}{2}$ miles NW. of Colison point. They are steep-to, and from 150 to 270 feet high.

Cockroach rock. Two cables westward of the George or northern Dog, is the Cockroach rock.

Seal Dog islands. The Seal Dogs form a cluster of smaller islets NE. $\frac{1}{2}$ E. $1\frac{1}{2}$ miles from George Dog. The northernmost islet is only 6 feet high, the others 74 and 100.

Scrub island. Scrub island, 450 feet high, lies WSW. $1\frac{3}{4}$ miles from the West Dog, and is the easternmost of the numerous small islets and rocks which lie close off the E. end of Tortola, and which are only separated from each other by small intricate cuts from 1 to 3 cables wide.

Among these islands, which do not need any further description, are Guano island,* Great and Little Camanoe islands, Beef island, Buck island, and Marina cay. Most of these are high, averaging from 500 to 650 feet, except Marina cay, which is low.

Southern channels. Between the S. end of Virgin Gorda and the E. end of St. Johns, about 14 miles distant, is a range of very remarkable, small, rugged, and most irregularly shaped islets and rocks, the shores of which rise abruptly from the sea to the height of from 350 to 550 feet. Between most of them are deep and navigable passages leading into Sir Francis Drake channel, simple and easy of access in the day-time. In the smaller ones, however, a little precaution is necessary in a sailing-vessel to guard against the eddy tides and flaws of wind when coming under the lee of the larger islands.

* On the charts an anchorage is marked W. of Guano island, but during the season of rollers it is unsafe, as they break here in 8 or 9 fathoms.

The island of Fallen Jerusalem lies $\frac{1}{2}$ a mile SSW. of the S. point of Virgin Gorda. Fallen Jerusalem.

It is a remarkable heap of barren rocks 140 feet high.

A mile S. of Fallen Jerusalem is Round rock, 220 feet high. Between them lie the Blinders and other barren rocks, and the ground is rocky and foul in the cuts between them. Round rock.

Two-thirds of a mile SW. of Round rock is Ginger island, irregularly shaped and 500 feet high. Between these two islands is Round Rock passage, the best channel for vessels coming from the eastward, as the small islands to windward are too small to obstruct the regular breeze, and the channel is easily recognized by the remarkable appearance of Fallen Jerusalem, a mile to the northward of it. Ginger island.

Both sides of the channel are bold and steep-to, and there is no danger whatever in it.

Between Ginger island and Cooper island to the westward the channel is $\frac{3}{4}$ of a mile wide. Cooper island is $1\frac{3}{4}$ miles long NNW. and SSE. and its S. end is 530 feet high. Cooper island.

In the southern part of this channel is Carrel rock. It is 110 feet high, bold and steep-to, and may be left on either hand. Carrel rock.

Ginger island is so high that a sailing-vessel is very likely to be becalmed under its lee. For a steamer, or for a sailing-vessel with a SE. breeze, this passage is as good as Round Rock channel.

In the northern part of this channel, and just to the eastward of Cooper island, are the Cooper rocks. The passage between them and Cooper island, though deep, is too narrow to be used by a sailing-vessel. Cooper rocks.

Salt island, a quarter of a mile E. of Cooper island, is about $\frac{3}{4}$ of a mile in extent each way, and 380 feet high at its northern end. Off its NE. point is a rock awash, between which and Cooper island is a narrow channel, less than a quarter of a mile wide, and should not be attempted by a sailing vessel. Salt island.

Another passage into Sir Francis Drake's channel from the southward is between Salt island on the eastward and Peter and Dead Chest island on the W. side, called Salt Island passage. Salt Island passage.

Dead Chest island is a small islet 200 feet high, and E. by N. a little more than $\frac{1}{2}$ a mile from it is Blonde rock with 12 feet of water on it. Between this danger and Salt island is, however, a clear channel nearly a mile wide. To be sure of avoiding it, keep Salt island close aboard.

The channel between Dead Chest and Peter island is only $\frac{1}{4}$ of a mile wide, but straight, deep, and clear.

Peter island.

Peter island forms an elbow. The eastern part is 540 feet high and runs N. and S. $1\frac{1}{2}$ miles. The northern part is 440 feet high and runs E. and W. $2\frac{1}{2}$ miles. The channel between it and Norman island, to the westward, is crooked and seldom used. From the S. end of Peter island a reef of rocks stretches off $\frac{1}{3}$ of a mile, ending in Carrot rock, 84 feet high. Half a mile W. by S. $\frac{1}{2}$ S. from this rock is Carrot shoal, with 10 feet of water upon it. On the N. side of Peter island are two small bays, called Great and Little harbors.

Great harbor.

Great harbor is a snug little bight on the N. side of Peter island, about $\frac{1}{2}$ a mile deep and the same wide, and may be entered without the slightest difficulty at any time. The water is deep close up to the shore, and it has excellent holding-ground. The harbor is open to the NW., but Tortola protects it in that direction and makes it quite smooth.

Little harbor.

Little harbor, a short distance to leeward of Great harbor, is of much the same character, but more confined and more open. There is no water on Peter island. Both this island and Salt island are inhabited by fishermen.

Norman island.

Norman island is 2 miles long. It is crooked, narrow, and 440 feet high in its western part. On the western side is a good anchorage in from 7 to 11 fathoms in a small inlet, called the Bight, about $\frac{3}{4}$ of a mile deep and $\frac{1}{4}$ of a mile wide in its narrowest part. The shores on each side are steep-to, and the only danger to be avoided is Ringdove rock. The mark to clear it is Treasure point in line with the summit of the western hill. There is a narrow but deep channel between Ringdove rock and the northern point of the entrance.

The Bight.

Although the Bight is open to the westward, it is sheltered in that direction by the island of St. John.

Privateer bay.

There is also good anchorage in Privateer bay, just S. of Treasure point, with the regular trade-wind.

Flanagan or Norman pass is the westernmost of the southern channels, and in the narrowest part, between the Indian rocks and Flanagan island, it is a mile wide. This passage is the most difficult to enter from the southeastward, on account of the Santa Monica rock, which lies right in the way. This rock is very small, with only 10 feet water on it and 17 fathoms close to, and lies SSW. $\frac{1}{2}$ W. $\frac{3}{4}$ of a mile from the W. end of Norman island and SSE. $\frac{3}{4}$ E. from Flanagan island. Fort Charlotte, on Tortola, in one with the highest of the Indian rocks, N. $\frac{1}{4}$ E., leads to the eastward of it; and Bellevue, the highest hill on the E. end of Tortola, in one with the Indian rocks, N. by E. $\frac{1}{2}$ E., leads to the westward.

The Indians are four remarkable small pinnacle rocks, 50 feet high, close together, at about a cable westward of a small islet, 180 feet high, named Pelican island, which lies $\frac{1}{2}$ a mile from the NW. point of Norman island.

When approaching Flanagan passage from the eastward the best way will be to haul close round the W. side of Norman island, which may be done without fear at the distance of about $1\frac{1}{2}$ cables.

In beating up or running down along the shore, by keeping Cooper and Ginger island just open of Peter island, a vessel will pass $\frac{1}{2}$ a mile to the southward of the Sta. Monica rock.

Sir Francis Drake's channel lies between the islands we have just been describing on the S., and Tortola and the islands E. of it on the N. It is clear of dangers except in the vicinity of Road harbor, in the island of Tortola, where there are several shallow banks. In the other parts of the channel a vessel may anchor anywhere to the eastward of a line drawn from Buck island to Dead Chest island.

Sir Francis
Drake's channel.

With strong N. and NE. winds there is good anchorage on the SW. side of Beef island.

The island of Tortola is 10 miles long ENE. and WSW., $3\frac{1}{2}$ miles wide, and of a very irregular outline. It is very mountainous; Sago mountain in the western part attaining a height of 1,780 feet. In 1861 the inhabitants numbered about 6,000, including a few persons on Beef, Guano, Camanoe, and Thatch islands.

Tortola.

Road harbor.

Road harbor is on the SE. side of Tortola, and the only port of entry in the British portion of the Virgin islands. Being completely exposed to the SE., it may be more properly described as a bay, about $1\frac{1}{4}$ mile deep, $\frac{3}{4}$ of a mile wide, and surrounded by an amphitheater of lofty hills, the spurs of which reach the edge of the shore; mount Sage overlooking it on the west, and mount Bellevue on the east, the latter 1,270 feet above the sea.

Vessels of large draught should not attempt to enter without a pilot.

Road town.

The town and seat of government stands on the western shore of the harbor, and immediately above it a spur of the main ridge reaches 940 feet high, where Fort Charlotte formerly stood, but no part of it is now seen. At the foot of this ridge, at the western point of the bay, is Fort Burt house and flag-staff. On the eastern side, immediately opposite, and scattered along the shore, is the village of Kingston. The anchorage is so confined by the numerous shoals at its entrance and within it, especially on the lee or western side, that it is only adapted for vessels of moderate draught; and it is very inconvenient, from the heavy swell which prevails in the winter season.

Under the lee of the reef at Fort Burt point, on the western side of the entrance to the harbor, there is a small well-sheltered vein of deep water, which affords a good careening place for coasters of about 9 or 10 feet draught.

Denmark, Scotch, and Lark banks.

There are from 2 to $6\frac{1}{2}$ fathoms water on the Denmark banks, the eastern extreme of which lies nearly midway between Hog and Slaney points, the outer extremes of the harbor with the western of the two trees north of the town, its breadth over the E. end of Wickham cay, and the two white houses, near Fish bay, in line. The above tree open of Wickham cay clears the bank in 13 fathoms water, but close to.

Within the Denmark banks, in the narrowest part of the entrance between Fort Burt point and Kingston, are the Scotch and Lark banks; the latter, which lies nearest to Fort Burt point, and 400 yards eastward of the dry reef off it, has only $2\frac{1}{2}$ fathoms water on it; the former lies 600 yards from the eastern shore, and has 2 fathoms on it.

The SW. extreme of the Scotch bank lies with the western of the two trees, its breadth open eastward of Little Wickham cay, and the right side of the Upper white house in line with the left side of the Lower white house, near Fish bay.

The eastern extreme of the Lark bank lies with the small mangrove-bush in line with a house between the poor-house and Fort Burt point, and the western tree its length open eastward of Wickham cay. The eastern tree in line with the western part of Little Wickham cay clears the bank, but a vessel should not go nearer. The channel into the harbor lies between these banks, and is 600 yards wide.

Wickham and Little Wickham cays, at the N. W. part of the harbor, are low, covered with mangrove-bushes, and show well against the cultivated ground behind them; there are two cocoa-nut trees on the SE. part of Wickham cay, but they are slender and not easily made out. A small vessel may, however, run in with Todman peak bearing NW. by W. and in line with the cocoa-nut trees. This mark leads over one of the outer coral patches in $4\frac{1}{2}$ fathoms.

On Half Moon point, eastward of Hog point, is a white house and a wall; and on Fort Burt point, at the W. side of entrance to the harbor, is a small house with a flag-staff and union-jack. In a vessel of heavy draught, bring the white house on Half Moon point to bear NNW., and stand in on this bearing until at the distance of about 600 yards from the point; or the summit of the second hill, (the site of Fort Charlotte,) within Slaney point, is on with or a little open southward of the flag-staff at Fort Burt point bearing W. $\frac{3}{4}$ N.; then run along shore with this mark on in about 13 fathoms water, passing Hog point at 300 yards, until the eastern and larger of the two trees northward of the town is in line with the middle of Little Wickham cay NW. $\frac{1}{4}$ W., which mark will lead between the Lark and Scotch banks to the anchorage between Shirley and Fort Burt points.*

Having entered the harbor under easy sail, when the flag-staff at Fort Burt point bears W. by S. the vessel will be just within the shoals, and may then round to and anchor in 10

* Vice-Admiral Sir J. Hope, R. N., 1865.

fathoms, with Shirley point bearing about NE., distant 400 yards, or with the western of the two trees in line with the E. end of Little Wickham cay NW. $\frac{3}{4}$ W., and the small and NE. mangrove-bush off Fort Burt point on with the flag-staff WSW., in from 7 to 13 fathoms water, very uneven bottom.

Handy vessels of light draught, or steamers, having brought Fort Burt point on the above bearing, may haul up about NNW. and proceed in so far as to bring the cocoa-nut trees on the SE. end of Wickham cay to bear W. by N., taking care to anchor eastward of the line of the outer part of Slaney point, touching the right extreme of Flanagan island. They will here have room to weigh and avoid the harbor-spit, which stretches out from the westward into nearly the middle of the anchorage.

It is high water, full and change, in Road harbor at 8^h 30^m. Springs rise $1\frac{1}{2}$ feet. The lowest tides are in April and May. To the westward of Road harbor, about a mile, is Sea Cow bay. It may be used as a temporary anchorage for small vessels.

Soper's hole. Soper's hole is a deep, snug bight between Frenchman's cay and Little Thatch island on the S., and the western point of Tortola on the N. side, and sheltered from westerly winds by Great Thatch island. In the middle of the anchorage there are 12 fathoms, gradually decreasing to 6 fathoms close to shore.

Soper's hole may be approached either by the passage between Little Thatch island and the western end of Tortola, or by that between the former and Frenchman's cay. The W. point of Little Thatch island and the W. point of Tortola must not be approached nearer than a cable's length, on account of off-lying rock, which extend to that distance in each case.

Thatch island cut. The passage between Thatch island and Tortola, called Thatch Island cut, must not be attempted by a sailing-vessel from the northward except with a flood-tide, as the eddies and stream are very strong.

Great Thatch island. Great Thatch island is $1\frac{3}{4}$ miles long E. and W. and 680 feet high. Its eastern point, forming the western side of Thatch Island cut, is bold and steep-to.

In the channel between St. John and Tortola the flood-tide runs to the eastward and the ebb-tide to the westward, with a velocity of from 3 to 4 knots.

Vessels should be prepared to meet the gusts and baffling winds which rush down through the valleys of Tortola.

The only anchorage on the N. side of Tortola is Cane Garden bay, where small vessels may find a temporary shelter. Across the entrance there is a bar with 12 feet of water. Inside of this bar there are 3 and 4 fathoms, within a reef which runs out from the S. side of the bay. The small village of Cane Garden extends along the shore at the bottom of the bay.

St. John island is 8 miles long E. and W., but of irregular breadth. Its E. end, for the distance of three miles, is formed by a narrow neck of land from a mile to less than $\frac{1}{2}$ a mile across, and from its inner end the coast turns sharp to the southward, forming a deep bight, which terminates at Ram head, a remarkable bold headland, on which are two hummocks, the highest 300 feet above the sea, and forms the S. point of the island; from thence across to May point, on the N. side, the island is 5 miles broad. The western portion is composed of irregular hills and peaks, the loftiest of which, called the Bordeaux mountains, reaches the height of 1,270 feet. The spurs from the heights terminate abruptly at all the projecting points, and, with the exception of a small spot at Coral bay, nothing is seen but hill and dale.

Coral or Crawl bay is situated at the E. end of St. John and is open to the SE. Its entrance, from Moor's point on the eastward to Sabbat point on the W. side, is $1\frac{1}{4}$ miles wide. The shore within the bay is divided into three smaller bays, and these are cut up into several small coves and creeks.

The westernmost of these three bays is called Coral harbor; the middle one Hurricane hole, and the eastern one Round bay.

There is no town or village in Coral bay, but at Coral harbor the Moravian missionaries have a little establishment called Carolina, from which place bridle-paths lead to all parts of the island.

Large vessels seldom visit this bay, and the produce of the neighboring country is carried by coasters to St. Thomas and Santa Cruz.

Buck or Duck islet.

About half-way between Ram head, the southern point of the island, and Moor point is Buck or Duck islet, 84 feet high. There is a channel on both sides of it.

Eagle shoal.

In using the channel to the westward of it, care must be taken to avoid the Eagle shoal, lying nearly 1 mile NE. by E. $\frac{1}{2}$ E. from the outer extreme of Ram head and $\frac{3}{4}$ of a mile S. $\frac{3}{4}$ W. of the E. end of Buck or Duck island.

The shoal consists of two patches of coral, about 40 yards each in diameter and half a cable apart E. and W. The easternmost has only 4 feet and the westernmost 12 feet of water upon it. They are steep-to, with from 6 to 7 fathoms all around them. The United States Hydrographic Chart No. 326 or the English Admiralty Charts will be the best guide to avoid them.

Hurricane hole.

Of the three anchorages in Coral bay, Hurricane hole, being partly sheltered from SE. winds, is the best and safest. A good berth is in 11 fathoms of water, with Turner's point bearing SE. $\frac{1}{2}$ E. and Harbor point W. by S.

Round bay.

In Round bay the best anchorage is in 13 fathoms of water, with Moor's point bearing SE. by E. $\frac{1}{2}$ E., 3 cables distant. As a temporary anchorage with the usual trade-winds this is a good berth, but with a SE. wind it is very rough.

Coral harbor.

In Coral harbor there is a less depth of water than in the two other anchorages of Coral bay, and it is only fit for a temporary berth for a small steamer.

Tides.

The tides set across the mouth of Coral bay; the flood to the SW. and the ebb to the NE. at the rate of $\frac{3}{4}$ of a mile an hour. There is no tidal stream within the bay, and the rise and fall of springs rarely exceeds 1 foot. The time of high water, at full and change, varies from 7^h to 9^h.

Great and Little Lameshur bays.

WNW. from Ram head is Cabrite point, between which and White point, $\frac{3}{4}$ of a mile to the NW., are Great and Little Lameshur bays. The former affords shelter for small vessels in 9 fathoms of water just under Cabrite point.

Reef bay.

Reef bay, 1 mile NW. of White point, is easily distinguished by a remarkable white cliff, 135 feet high.

There is no shelter except for boats.

Fish bay, westward of Reef bay, is only 200 yards wide between the reefs at its entrance, but nearly 800 yards deep; within the bay the soundings gradually decrease from 4 fathoms to the shore. Fish bay.

Rendezvous bay, to the westward of Dittless point, is 1,200 yards wide and 1,000 yards deep, with a depth of from 5 to 6 fathoms, quite free of danger, but open to the southward. Rendezvous bay.

Great Cruz bay, at the SW. end of St. John, affords good shelter for drogers; it is a little more than 200 yards wide at the entrance and about 800 yards deep. From between the two bluffs at its entrance the water gradually decreases from 4 to 3 fathoms, and then suddenly to 2 fathoms. Great Cruz bay.

Little Cruz bay is a small cove at the western extremity of St. John, but only fit for coasters. There is a village on the shore, and a white building called the Fort. An excellent road leads thence to the upper parts of the island and Coral bay. Little Cruz bay.

To the westward of Little Cruz bay there is anchorage in 11 fathoms water, over sand and mud, with the fort bearing E. by S. $\frac{1}{2}$ S., distant $\frac{1}{4}$ a mile; the centre of the Two Brothers in one with the W. point of Grass cay; and the dry rocks off the E. side of Meeren cay in one with the Dog rock. Anchorage.

A vessel may approach this anchorage by the passage between Meeren cay and St. John, but it cannot be recommended to sailing-vessels on account of the baffling winds under the high land. The best mark to run through it from the southward is the Carvel rock, off the E. end of Congo cay, and the western hummock on the W. end of Jost Van Dyke in one, bearing N. by E. The reef off Turner bay and the dry rocks off Meeren cay are bold and steep-to; but care must be taken to guard against being set out of the course by the strong tide that runs at the rate of 2 knots between the islands and the main, the flood to the southward, the ebb to the northward. The best way, however, will be to pass to leeward of Meeren cay, and to stand on until the vessel can fetch the anchorage. Directions.

At $1\frac{1}{4}$ miles northward of Little Cruz bay, and $\frac{1}{4}$ of a mile from Hogsnest point, is the largest of the three Durloe cays, Johnson's reef.

68 feet high; the other two cays, 45 and 18 feet high, are about 300 and 400 yards NE. and NW. of it. Nearly midway between these cays and Whistling cay, 250 feet high, 2 miles to the eastward, is Johnson's reef. It is $\frac{1}{4}$ of a mile in length, 1 cable in breadth, lies $\frac{1}{2}$ a mile from the shore, and always breaks. There are $3\frac{1}{2}$ fathoms water 200 yards N. of it, 3 fathoms at about the same distance E. and W. of it, and between it and the shore irregular soundings, varying from $1\frac{1}{2}$ to 10 fathoms.

Francis bay.

Francis bay, formed by Mary point, and somewhat protected as far round as NW. by Whistling cay, is about 1 mile deep and the same in breadth, and affords good anchorage in 9 fathoms water, sand. Between Whistling cay and the shore southward of it is a bank 800 yards in length and 250 in breadth, fronting the bay, with $3\frac{3}{4}$ to $4\frac{1}{2}$ fathoms water on it. The cut between Whistling cay and the main is clear, but not easily navigated on account of the baffling winds from the high land forming Mary point.

Leinster bay.

On the northern shore of St. Johns, southward of Thatch Island cut, is an indentation of about $\frac{3}{4}$ of a mile in length and about $\frac{1}{4}$ of a mile deep. The western part of it, called Leinster bay, is separated from Francis bay by a narrow neck of land only 300 yards across, and the shore is here fringed with a coral ledge awash, easily seen from the deck. Its eastern part is named Smith bay, where there is a small cay, called Water-Melon, under which a vessel may anchor at about 200 yards from the shore. This cay is bold and steep-to, and is separated from St. Johns by a channel carrying 12 feet water, 200 yards wide. A vessel must shoot up under its W. side, and anchor midway between it and the beach to leeward, which is about 400 yards distant.

There are several other small bays on the northern side of St. Johns where small vessels may find temporary shelter, but, being exposed to the rollers, they are not safe for the night.

The island of St. Thomas is mountainous, and in its general aspect much resembles St. Johns. It extends 12 miles E. and W., and is from 1 to 3 miles wide. A chain of mountains runs along the middle of the island, with spurs branching to the N. and S., and terminating abruptly at the sea-shore. The two principal eminences are Signal hill, nearly

in the middle of the island, 1,500 feet high, and West mountain, 1,550 feet high. The island is surrounded by small islets and rocks, which are almost universally steep-to, with very few hidden dangers.

St. Thomas harbor, on the south side of the island, is excellently protected from all ordinary winds, and is perfectly easy of access. The town called Charlotte Amalia owes its commercial importance to its being a free port, and also to its being headquarters in the West Indies for numerous steamship lines. During the last few years it has suffered very severely from hurricanes and earthquakes.

St. Thomas.

The island is in telegraphic communication, *via* Havana, with the United States and Europe, and with Brazil by way of the Windward islands.

The town is situated on the sides of three small hills formed by spurs from the central mountain.

A *fixed white* light is exhibited from a new iron light-house on Muhlenfels point at a height of 118 feet above the sea. It can be seen at a distance of 12 miles.

Light.

Supplies of all sorts can be readily obtained at St. Thomas. Water is brought alongside at the rate of 2 or 3 cents a gallon. Coal costs about \$10 per ton.

There is an excellent floating dry-dock at St. Thomas, as well as a marine railway.

The following rates per ton are fixed for docking vessels:

From—	First day.	For each of the next five days.	Subsequent days.
1,001 tons and upwards.....	\$1 50	\$0 25	\$0 20
901 tons to 1,000	1 40	25	20
801 tons to 900	1 30	25	20
701 tons to 800	1 20	25	20
601 tons to 700	1 10	25	20
501 tons to 600	1 00	25	20
401 tons to 500	90	25	20

The dimensions of the floating-dock are as follows:

Length	250 English feet.
Breadth inside	70 English feet.
Length of keel which can be taken, about.	300 English feet.
Greatest draught of water at which a ship can be taken on, about	20 English feet.
Gross weight capable of being lifted....	2,700 tons.

The only establishment where steam-machinery can be repaired is the repair-shop of the Royal Mail Company.

Tides.

The phenomena of the tides at St. Thomas have been carefully observed for many years by the U. S. Coast Survey, to obtain material for aiding in the determination of the laws governing the tides of the Atlantic. From the data thus obtained, the following general conclusions are deduced.

It was found that meteorological conditions very seriously affected the tides.

Time of high water at full and change.....	9 ^h 40 ^m
Maximum rise and fall.....	2 feet.
Minimum rise and fall.....	0.9 foot.
Average.....	1.2 foot.

There is usually but one high and one low water in a lunar day, the high water following the moon's upper transit when her declination is north after an average interval of about 9 hours and 40 minutes; but when the moon's declination is south, the high water follows her lower transit after an average interval of about 9 hours and 40 minutes. For a day or so before the time of the moon's zero declination and a day or two after it, there is often a tendency toward a high and a low water after both upper and lower transits, but the rise and fall is then so small that the effects become much mixed up with those due to meteorological influences. When the moon's declination is considerable the lunital interval is tolerably regular for a place having so little rise and fall of tides, but near the times of zero declination it becomes subject to greater variation of the average value. The average duration of rise is about 9 hours, and of fall nearly 16 hours.

These tides are so little dependent on the moon's age that we should not give a correct account of them if we attempted to treat them in the usual way, as spring and neap tides, and referred them to the times of the full and change of the moon.

The highest normal tides observed rise about a foot above the mean yearly level of the ocean, and the lowest ones fall about a foot below it; while the average rise and fall at or near the time of the moon's greatest declination, when it is usually greatest for the lunar month, is about 1.2 foot, but

varies between 0.9 foot and 1.4 foot. The ocean level also changes between the limits of $1\frac{1}{2}$ tenths of a foot below the yearly mean in March, and $2\frac{1}{2}$ tenths above it in September.

In approaching the harbor of St. Thomas from the eastward, two small islands to the southward will be observed.

Frenchman's cap, the most southerly of these, is a small islet 195 feet high, lying SW. by S. $\frac{1}{2}$ S. $4\frac{1}{2}$ miles from Dog island, at the eastern end of St. Thomas. It is perfectly steep-to.

Buck island, the other of these two, is larger than Frenchman's cap, and 120 feet high. It lies SE. $\frac{3}{4}$ S. from the lighthouse. On the S. and E. sides it is steep-to; on the N. side there are 5 fathoms of water at the distance of $\frac{1}{2}$ a cable, and off the west end a ledge of rocks runs to the same distance.

At the distance of a mile and a tenth N. of the central part of Buck island and a little more than $\frac{1}{2}$ a mile from the shore of St. Thomas, is Packet rock, a small coral shoal, with only 5 feet of water on it.

The sea does not always break on it, and it is steep-to, and can only be seen at a short distance.

There is a clear channel between it and St. Thomas.

To avoid it in coming from the eastward do not pass to the northward of a line drawn from Ram head through the S. extreme of Dog island till you are to the westward of Buck island.

About half-way between Green cay and Muhlenfels point there are three rocks called the Triangles. They are from 1 to 4 feet above low water and about $\frac{1}{3}$ of a mile from the shore.

S. of these three rocks about 200 yards there is a small detached rock about 35 yards in diameter and having 17 feet of water upon it.

A black buoy, with staff and ball, has been placed about $\frac{1}{2}$ a cable S. of this rock.

The houses on the summit of the middle hill of the town well open westward of Muhlenfels point clears both these dangers.

A large ship, approaching the harbor from the eastward, should keep East Gregerie channel well open till the Water

battery bears N. by W. $\frac{1}{4}$ W., when she can steer in for it on that course.

Point Knoll. Off Muhlenfels point at a distance of 150 yards is a small coral head with 3 fathoms of water on it, called point Knoll.

Scorpion rock. In the entrance to the harbor and about half way between Cowell point and Muhlenfels point lies the Scorpion rock, about 27 yards long, 10 yards wide, and having 20 feet of water on it at the lowest spring-tides. At 50 yards distance on each side of the rock there are from 28 to 30 feet.

Buoy. There is a red buoy with staff and ball on the rock, having a red light upon it when steamers are expected.

Rhode bank. Rhode bank is on the east side of the channel, and consists of 3 coral heads close to each other, with from 15 to 17 feet of water on them. It bears NW. by N. from Muhlenfels point about 450 yards from the light-house.

Buoy. It is marked by a black buoy with a cage-work beacon about it.

Rupert rock. Rupert Rock is also on the east side of the channel, and, being kept whitewashed, is easily distinguished by night or day. It is 13 feet high, and lies about $\frac{1}{2}$ a mile northward of the light house, and $\frac{1}{4}$ of a mile ENE. of Frederick point, on the west side of the channel.

At its base are some large boulders which extend westerly 50 yards, and are just covered with water.

On the westernmost of the rocks is an iron beacon with a diamond-shaped head painted white. Between Rupert rocks and the nearest point there are only 15 feet of water.

Quarantine anchorage. The anchorage for vessels in quarantine lies between Rupert rock and Rhode bank, having from 5 to $3\frac{1}{2}$ fathoms.

Frederick knoll. On the west side of the entrance the shore is steep-to, except directly off Frederick point at the narrowest part of the entrance, where there are two rocky heads with 16 to 17 feet of water on them from 75 to 100 yards from the battery. These are the only dangers on the east side of the channel.

Kiær rock. The danger formerly known as the Kiær rock no longer exists, having been scraped down to a depth of 21 feet.

Anchorage. The best anchorage in St. Thomas harbor for a ship of large draught, and a good position for weighing, is with the highest part of Rupert rock in one with the light-house, and Long bay fairly open, in $5\frac{1}{2}$ fathoms.

Care must, however, be taken to observe the port regulation, which forbids a vessel anchoring in front of the fort, so as to mask it, or prevent it from taking a range of the whole entrance of the harbor. The sterns of vessels anchoring to the eastward must consequently not be more westerly than to bring the flag-staff of the fort to bear NNW., and the bows of vessels anchoring on the western side of the harbor not more easterly than to bring it N. by E. Merchant-vessels discharging cargo lie off the town to the westward of the fort; those ready for sea, preparatory to sailing, warp into Long bay, to the eastward of it.

At night there is no difficulty in entering St. Thomas harbor, but in this case it will be better to pass outside Buck island between it and Frenchman's cap, and having brought the light to bear north—to avoid the Triangles and the 17-foot rock south of them—stand boldly in toward the entrance. The Rupert rock being whitewashed will soon show itself.

Although the entrance to St. Thomas harbor presents no difficulties, the assistance of a government pilot, one of whom always comes alongside to offer his services, is frequently useful to point out a convenient berth.

Pilots.

It is high water, full and change, in St. Thomas harbor at 7^h to 9^h, and the rise at springs seldom exceeds a foot. The mean level of the sea is a foot lower in April and May than at other times.

Gregerie channel, immediately westward of St. Thomas harbor, is formed by Water island to the south, and the shore of St. Thomas on the north. It makes a complete elbow, sweeping round from the west, northerly, to the east. The eastern arm, named East Gregerie channel, trends NW. and SE., and is free from danger, with a depth of from 6 to 7 fathoms. At its entrance, between Cowell point and Sprat point, it is $\frac{1}{2}$ a mile wide, and at the elbow or north-west end, between Careen hill and Banana point, $\frac{1}{4}$ of a mile. The southwest arm, named West Gregerie channel, is about the same length, and $\frac{1}{4}$ of a mile wide, with a depth of from 6 to 9 fathoms. At the head or elbow it opens out into a basin $\frac{1}{2}$ a mile in diameter, well sheltered, but obstructed in the centre by the Gregerie bank and Sandy point rock.

Gregerie channel.

Gregerie bank. Gregerie bank is a small patch of dead coral and sand, about 80 yards long and 40 yards wide, and the least water on it is 15 feet, which depth lies with Cowell point just shut in by Banana point, and Saba island by Regis point. Its southern edge is marked by a red buoy.

Sandy Point rock. Sandy point rock is small, with only 2 feet water on it, and lies near the end of the shallow sand-spit which runs off 200 yards to the NW. from Sandy point. When on the rock Cowell battery will be seen just over Banana point. The distance between it and the Gregerie bank is a cable's length, and the channel between carries a depth of 22 feet. In the channel to the northward of the Gregerie the depth is not less than 27 feet at about $\frac{1}{2}$ a cable from the bank,

Anchorage. Anchorage will be found anywhere in Gregerie channel clear of the shoals. The safest and most convenient spots are in the elbow and southwest arm, for a vessel will there be more sheltered.

In passing through Gregerie channel with a long vessel it must be remembered that the turn in the channel is quite short, and it would therefore be well to mark Gregerie bank with a boat.

Great Krum bay. Great Krum bay is a small inlet running up between two lofty hills at the western side of the entrance to the southwest arm of Gregerie channel. It is about 4 cables deep and 70 fathoms wide in its narrowest part, with a vein of water in the centre shallowing from 40 to 20 feet. This bay is used as a convenient spot for breaking up vessels.

Mosquito bay. Close to the westward of Great Krum bay is Mosquito bay, about $\frac{1}{2}$ a mile wide between Mosquito and Red points, $\frac{1}{2}$ a mile deep, and open to the southward. Off the latter point a narrow rocky ledge extends along $\frac{1}{4}$ of a mile to the S. by W., and on its extreme end is a small coral head, called Red Point shoal, with only 2 feet water on it, and steep-to. Within the bay the depth from 5 fathoms gradually decreases toward the shore, but with this dangerous ledge under the lee it is only safe for droghers.

Porpoise rocks. Three small rocks, just out of water, and connected by a shallow ledge, compose a group called the Porpoise rocks, which occupies a space of about $\frac{1}{4}$ of a mile NE. and SW. They are steep-to, and lie west about $\frac{2}{3}$ of a mile from the southwest end of Water island, with a deep and clear channel between.

There is excellent anchorage under the W. side of Water island for vessels of the largest draught. If intending to anchor here, run in about midway between the Porpoise rocks and the island, and come to in 9 fathoms water, as soon as the town of St. Thomas is seen coming open to the northward of the island; or with the south extreme of the island SE. by S., and the N. end of Drif bay beach E. by N., distant $\frac{1}{2}$ a mile. Water island anchorage.

S. W. road, between Perseverance bay and Flat cays, is a good temporary anchorage with the wind as far to the southward as ESE. The approaches to it are free of dangers, except Red Point shoal. This shoal lies a long quarter of a mile off Red Point, and to avoid it keep Flag hill peak (on the E. side of the harbor of St. Thomas) open to the southward of Mosquito bay point, until the S. points of Flat and Turtle Dove cays are in one SW. $\frac{1}{2}$ W., when haul up and anchor as most convenient. Mosquito point and Flag hill peak in one E. $\frac{3}{4}$ N. leads half a cable southward of the Red point shoal in 9 fathoms of water.

S. W. road.

Inshore there is scarcely any stream, but between Flat cays and Saba island the flood during the springs runs to the ESE. at the rate of about a knot, and the ebb in the opposite direction with the same velocity. Tides.

On the N. side of the island of St. Thomas there are no good anchorages. Directly across the island from St. Thomas harbor is a deep bight called Great North Side bay, the eastern side of which is formed by a long tongue of land extending to the NW. from the main island.

The bay is open to the NW., and therefore liable to rollers. A temporary anchorage may be found under the weather-shore.

The only danger in approaching is the Ornen rock, lying half a mile NW. by W. $\frac{1}{2}$ W. from the extreme point of the tongue of land just mentioned.

At the eastern end of St. Thomas, and between it and Great St. James island, is St. James bay, well sheltered, except to the SW., and affording good and secure anchorage except during the hurricane season. To enter it, pass the rocks called the Stragglers, off the S. end of Great St. James island, at a distance of 100 yards, and anchor with the S. extreme of these rocks bearing about SSE. $\frac{1}{2}$ E., distant 700

yards, and Fish cay in the eastern part of the bay bearing E. by N. $\frac{1}{2}$ N.

East of the Stragglers, at half a mile distance, are the Cow and Calf rocks, between which and the nearest point of St. Thomas island there is a channel having irregular soundings of from 5 to 9 fathoms. In passing through this channel the fort in Little Cruz bay (St. John)—which being whitewashed and standing alone is easily distinguished—should not be opened to the northward of Great St. James; the fort in one with the NW. point of that island will bear NE. by E. $\frac{1}{2}$ E.

There is an excellent anchorage in the space between the islands of St. Thomas and St. John, quite sheltered from all winds except southerly ones, which only blow during hurricane months.

This space is called the Sound, and is sheltered on the N. side by Congo, Lovango, Grass, Mingo, and Thatch cays, from 200 to 300 feet in height.

This roadstead is secured against rollers, but the tides are very strong.

The Brothers. The Brothers are two small barren rocks, 20 feet high, lying in the middle of the sound. A ledge runs off gradually from their N. side, deepening to 5 fathoms at the distance of 250 yards; they may be approached on their S. side to the distance of 100 yards.

To enter the sound from the southward the channel lies between St. John and Dog islands, at the E. end of St. Thomas.

South channel
to the sound.

The Brothers may be passed on either side, but care must be taken not to pass to the eastward of a line drawn from the W. end of Grass cay to the S. end of Meeren cay, in order to keep clear of the reef off Turner bay.

There are three channels by which a vessel may enter the sound from the N., called the Windward, Middle, and Lee-ward channels. A detailed description of them will be found on page 419. The approaches to the northern channels between the islands to the northward of Tortola, St. John, and St. Thomas, present no serious difficulty. The eastern passage between Tortola and Jost Van Dyke is especially clear and safe. It is only necessary to keep in mid-channel, where the least water is 9 fathoms.

Jost Van Dyke island lies about $3\frac{1}{2}$ miles from the NW. side of Tortola. It is $3\frac{1}{8}$ miles long E. and W., $1\frac{1}{4}$ miles broad, lofty and rugged, bold and steep-to, and toward the E. end it rises to the height of 1,060 feet. On the S. side are two small bays called Great and Little harbors; the former about $\frac{1}{2}$ a mile deep, with from 3 to 8 fathoms water in it; the latter, more snug, has 6 fathoms about $\frac{1}{3}$ of a mile within the entrance, but they are only fit anchorages for coasters.

Jost Van Dyke
island.

Little Jost Van Dyke island is 1 mile in length, $\frac{1}{2}$ a mile in breadth, 370 feet high, and is separated from the E. end of the greater island by a shallow ledge 200 yards wide. Close to its E. end is a small islet named Green cay, 110 feet high and 300 yards long. S. of the cay there is a small dry rock, and shallow water for nearly $\frac{1}{4}$ of a mile.

Little Jost Van
Dyke island.

Sandy cay lies S. nearly 1 mile from Green cay, and $\frac{3}{4}$ of a mile from the E. end of Jost Van Dyke. Its E. end is 66 feet high, but to the westward it terminates in a low sand-spit, and both ends are foul to the distance of 200 yards. The channel between it and Jost Van Dyke is $\frac{1}{2}$ a mile wide, but the Jost Van Dyke shore, which is steep to, must be kept aboard. Sandy cay is about $2\frac{1}{2}$ miles westward of Cane Garden bay, in Tortola, and with Green cay bounds the W. side of the easternmost of the northern channels.

Sandy cay.

Great Tobago lies 2 miles westward of Jost Van Dyke, and is $\frac{3}{4}$ of a mile long N. and S., $\frac{1}{2}$ a mile broad, and 540 feet high. A small rock awash and steep-to lies about 100 yards from the N. point. The S. side of the island is fringed with coral to a short distance, but all elsewhere the shore is bold close home to the cliffs. At $\frac{1}{4}$ of a mile from the nearest part of the W. side there is a remarkable small barren perpendicular rock named Watson rock, steep-to, and terminates in a peak 90 feet high.

Watson rock.

The channel between Jost Van Dyke and Great Tobago is clear of dangers with the exception of the Mercurias rock, having 7 feet of water on it and lying E. by S. $\frac{1}{2}$ S. $\frac{3}{4}$ of a mile from the N. point of Great Tobago.

Mercurias rock.

The rock is small and steep-to and can easily be avoided by keeping the Jost Van Dyke shore aboard.

Little Tobago is a small islet lying SW. about 1 mile from Great Tobago; it is nearly $\frac{1}{2}$ a mile in length, $\frac{1}{4}$ of a mile in

breadth, and 280 feet high. There is a safe and clear channel between these islands, but as nothing would be gained it will be better to pass through either of the others; should it be necessary, however, to take it, keep a little to windward or eastward of Little Tobago, taking the bearing of Watson rock to avoid the King rock.

The King rock; lying awash on the S. side of Great Tobago, is small, but it may be seen $\frac{1}{2}$ a mile off from a vessel's deck. It is bold and steep-to at $\frac{1}{2}$ a cable off, and between it and Great Tobago the depth is 6 and 7 fathoms. From the rock the south point of Little Tobago is in one with the N. extreme of the small low rocks off the N. end of Little Hans-Lollik, bearing W. by S. southerly, and Watson rock NNW. $\frac{1}{4}$ W. distant $\frac{1}{2}$ a mile.

Hans lollik.

Hans-Lollik is a high rocky islet lying $1\frac{1}{2}$ miles from the N. side of St. Thomas island and $3\frac{1}{2}$ miles SW. of Little Tobago.

Little Hans-Lollik.

Little Hans-Lollik is a smaller and lower islet 400 yards to the northward. The two are connected by a nearly dry coral ledge. Still farther to the N., at a distance of 200 yards, is a third and smaller islet with a sunken rock close off its N. side.

Hans Lollik rock.

The W. sides of these islets are steep-to, but to the southward is the Hans-Lollik rock, lying SE. by E. 700 yards from the S. point of Hans-Lollik. This rock is about 200 yards in diameter, is awash, and can be seen from a ship's deck about 1 mile.

To the southward of the chain of islets just described are the northern entrances into the sound.

Windward passage.

The easternmost of these, called the Windward passage, is the most convenient and lies between Lovango cay on the N. and the Durloe cays on the S. side. It is about 800 yards wide.

Durloè cays.

The Durloè cays are three small islets near the NW. point of St. Johns, and are easily distinguished. The most southerly and largest of these cays is 60 feet high. They are clear and steep-to.

Blunder rocks.

Off the E. end of Lovango cay are the Blunder rocks, awash, and extending about 400 yards from the cay.

Congo cay.

Congo cay is a short distance N. of Lovango cay, and has two remarkable rocks off its eastern point, of which the

easternmost, about 400 yards distant, is called the Carvel rock, and marks the western side of the entrance to the Windward channel. In this channel the ebb runs NE. by N., the flood SW., at the rate of 2 miles an hour. The channel may be used by the largest vessels as long as a speed of 4 knots can be depended upon, the current at times reaching $2\frac{1}{2}$ miles an hour. Should the wind die out, a vessel may anchor, observing that under 10 fathoms the bottom is rocky, and not good holding-ground.

The dangers in this channel are all apparent, but, with the ebb-tide running against the wind, there is a tide rip which looks like broken water, and is apt to alarm a stranger.

Between the Durloe cays and between them and the island of St. Johns there are deep and clear passages, but it is better to pass to the westward of the Durloe cays. Between Lovango and Mingo cays there is a 3-fathom passage, but, as it is narrow and the tides strong, it is only fit for boats.

The next channel to the westward lies between Grass and Thatch or Green cays, and is 600 yards wide. The only danger is a small rock awash about 200 yards W. by N. $\frac{1}{2}$ N. from the W. end of Grass cay. The E. end of Thatch cay is clear.

In Middle channel the flood sets to the southward about 2 knots, and takes a SE. direction inside. The ebb runs in the opposite direction with the same strength.

Leeward passage, between Thatch cay and the N. side of St. Thomas, is about 800 yards wide and is entirely clear of danger. The flood sets through to the eastward at the rate of from 2 to $2\frac{1}{2}$ knots, and the ebb with the same velocity in the opposite direction.

If the channel between Hans-Lollik and the Ornen rock is taken, keep the W. point of Thatch cay in one with Shark islet, SE. by E., until clear of the Hans-Lollik rock. Shark islet is small, rocky, 40 feet high, and lies near the shore at the E. end of St. Thomas.

Between Current Hole point, at the E. end of the island of St. Thomas and Great St. James island, is Current hole and passage. In the centre of the passage is the Current rock, between which and St. Thomas there are only 9 feet of water, but E. of this rock there is a narrow channel about 100 yards wide and 200 yards long. The tides rush through

here with great violence, the flood running to the southward with a velocity of 3 knots, and the ebb with equal force to the northward.

This channel is only fit to be used by small steamers or by handy sailing-vessels with a commanding breeze.

St. James channel.

A depth of 20 feet may be carried through the cut between Great and Little St. James, passing on either side of the Welk rock, which lies on the E. side of the islands. The channel is on the Great St. James side, but so circuitous as to be by no means safe. The eye will be the best guide for it.

Dog island.

The opening between Dog island and Little St. James is barred across with only 3 fathoms of water, and having also a 9-foot rock in mid-channel.

Neither of the last three channels should be attempted by a sailing-vessel, except in a case of emergency and with a commanding breeze.

Brass islands.

Brass islands are two small islets close off the N. side of St. Thomas, and about 3 miles westward of Hans-Lollik. They are each about $\frac{3}{4}$ of a mile long in a NW. and SE. direction, $\frac{1}{3}$ of a mile broad, and the Inner Brass is 260 feet and the Outer Brass 430 feet high. Between the inner islet and St. Thomas there is a 5-fathom channel, 400 yards wide; and between the two islets there is one of 7 fathoms, 600 yards wide, but they are only safe for coasters. The flood sets between them to the SW. at the rate of about a knot, but the ebb is scarcely perceptible. Under the Inner Brass there is secure and well-sheltered anchorage for coasters in 6 or 7 fathoms water, at about $\frac{1}{2}$ a mile off shore, with the N. end of the islet N. by E.

Lizard rock.

Lizard rock is a small rugged islet, 15 feet high, bold, and steep-to on all sides; it lies about $\frac{3}{4}$ of a mile westward of the Inner Brass island.

West and Salt cays.

West and Salt cays are only separated from the W. end of St. Thomas by a small boat-channel. They are each about $\frac{1}{2}$ a mile long in a NW. and SE. direction, and lie close together; Salt cay, the outer one, is 250 feet high, bold, and steep-to.

Dutchman's cap.

Dutchman's cap, nearly a mile to the northward of Salt cay, is a remarkable small rocky islet, rising abruptly from the sea to a peak 270 feet high, with deep water close

around. At about 100 yards from its SW. side there is a small rock 3 feet out of water. Between it and Salt cay the soundings are from 14 to 18 fathoms. At about 300 yards S. of the rock, and just outside of the 20-fathom line, a sunken rock is laid down on the chart, but the authority for it is not known.

Cockroach island is a small, rocky islet of irregular shape, with a flattish summit, and bold perpendicular cliffs, 155 feet high. It is nearly of the same size as Dutchman's cap, and lies about $1\frac{1}{3}$ miles northward of it. The passage between is quite free of danger. On the N. side of the islet the depth is 20 fathoms 200 yards off, and on the S. side 10 fathoms at 300 yards. Cockroach isl. and.

Cricket rock lies ENE. $\frac{1}{2}$ N. $\frac{1}{2}$ a mile from Cockroach island, and is the most northern islet of the group in this direction. It is 45 feet high, bold and steep-to, and there is a clear channel between the two islets. Cricket rock.

About $1\frac{1}{2}$ miles SW. from Salt cay is Savana island, 1 mile long, $\frac{1}{2}$ a mile broad, and 270 feet high. It is uninhabited, but used for breeding goats. On its W. side it is steep-to, having 16 fathoms a cable from the rocks. Some detached dry rocks extend nearly a cable from its S. point, with 15 fathoms close to their outer edge; there are also some straggling rocks 8 or 10 feet high, bold and steep-to, extending about a quarter of a mile off its eastern side. Close to its N. point is a small sunken rock. Savana island.

Turkey cay, in the middle of Savana island passage, is a small narrow islet $1\frac{1}{2}$ cables long, only from 20 to 30 yards broad, 80 feet high, and surrounded by deep water, except at the S. end, where there are 3 fathoms at a short distance. Turkey cay.

At about $\frac{1}{2}$ a mile to the SE. of the cay is the little islet named Salt Water Money rock, 10 feet high, also bold and steep-to, with a clear channel between. Salt Water Money rock.

About half-way between the N. end of Savana island and the W. end of Salt cay there is a small coral patch with only 5 fathoms of water on it.

Everywhere else in the passage the depths are from 13 to 16 fathoms.

In the Savana passage the tides run at the rate of 3 knots, the ebb to the NW. and the flood to the SE. West of Tides.

Savana island their direction is the same, but with a velocity of only 2 miles an hour.

Sail rock.

Sail rock—so called from its great resemblance to a vessel under sail—rises precipitously from the sea to the height of 125 feet. It lies S. by W. $\frac{1}{2}$ W. $3\frac{1}{4}$ miles from Savana island, and is about 100 yards in diameter, quite barren, with a light-grayish appearance, from its being the residence of birds at certain seasons. Nearly a cable to the WSW. of it there is a small rock nearly awash, and the only danger near it; on all other sides it is bold and steep to.

Santa Cruz.

Santa Cruz island is the most southerly of the Virgin islands, and lies about 32 miles S. of St. Thomas and St. John islands. It is 19 miles long ENE. and WSW., but of irregular breadth. The eastern end terminates in a bluff point, with a conical hill a short distance W. of it. The western part of the island is more elevated. Mount Eagle, $3\frac{1}{2}$ miles E. of the NW. point of the island, is 1,164 feet high. On the N. shore, at the head of a deep bight, is the town of Christiansted, the capital of the island, and the seat of government of the Danish colonies.

North coast.

From Hams bluff, formed of remarkable steep cliffs, for a distance of $5\frac{1}{2}$ miles eastward to Barons bluff the shore is steep to and the bank of soundings does not extend more than $\frac{1}{2}$ a mile off shore.

Between Barons bluff and Salt River point, at $1\frac{3}{4}$ miles eastward, but nearer the latter, is a narrow cut in a reef, leading to a deep inlet called Salt river, in which, however, there is only shelter for boats. Salt River point is rather low, and forms the N. extreme of Santa Cruz, and the NW. point of the bight of Christiansted. Four hundred yards N. of the point lies the White Horse, a dangerous rock which generally breaks; and between it and the shore there is a boat-channel carrying a depth of 2 fathoms.

From the above point the shore turns sharply to the SE. for 3 miles, to the harbor of Christiansted.

On the Danish charts of 1852, a bank with $7\frac{1}{2}$ fathoms is laid down 3 miles E. by N. $\frac{3}{4}$ N. from Salt River point.

Christiansted harbor.

Christiansted harbor is well protected on the N. by reefs almost dry. The harbor is small and only fit for a few vessels drawing not more than 17 feet. The entrance to it is intricate and the assistance of a pilot is requisite. The

mark for entering is fort Louisa Augusta, NE. of the town, on with the first hill E. of the saddle and bearing S. by E. $\frac{1}{2}$ E.

The entrance lies between the E. end of Long reef, which shelters the harbor to the northward, and the western side of the Scotch bank, a tongue of sand stretching to the northeastward for $1\frac{3}{4}$ miles from fort Louisa Augusta. On the flag-staff of this fort there is exhibited a harbor light, visible from a distance of from 2 to 4 miles.

In approaching Christiansted from the N. or NE. after passing Buck island, haul in toward Green cay, a small islet with two hillocks on it, $1\frac{1}{2}$ miles eastward of the fort. In standing toward the Scotch bank, take care to keep Barons bluff open of Salt River point. Having neared it, fort Louisa Augusta will be seen at the NE. end of the town, when it should be brought in line with the first hill to the eastward of a large notch or saddle formed by two hills. Steer in on this line, S. by E. $\frac{1}{2}$ E., very carefully, and it will lead to the entrance of the channel and outer buoys, which lie about 400 yards within it.

On arriving between the second red buoy on the left and a black buoy on the right hand, alter course to the westward, round the N. side of a dry sand-bank which will be seen ahead, passing between the two southernmost of three black buoys. From thence haul up round the NW. end of the middle shoal, and shape the course into the deep lane of water in the direction of the fort in the town, taking up an anchorage as most convenient; observing that the vessel will have to moor. Vessels drawing only 10 feet may lie alongside the jetty of the town.

There is a channel over the inner part of the Scotch bank, with the depth of 13 feet in the centre, which may be used by vessels of light draught.

Having closed with Green cay and entered by the southernmost red buoy, when westward of it, steer directly between Louisa Augusta point and the dry sand-bank westward of it. Continue on until the N. extreme of Protestant cay comes in line with the SE. end of Richmond house; then steer with this mark on, and pass northward of a small black buoy on the extremity of a bank stretching off from the E. side, and haul in for the anchorage. Richmond house is a

Scotch bank.

Light.

Christiansted.

Eastern channel.

large building with a *red* roof, standing in grounds of a park-like appearance on the sloping land near the sea.

Although easy of access at almost all periods, it is difficult to get out of the harbor, and in the months of January and February, when the wind hangs to the northward of E., a vessel may meet with considerable detention. With the usual trade-wind she must warp up to the entrance, and, as before stated, buoys are conveniently placed for that purpose. Toward daylight it is generally calm, when a vessel may be able to tow out, assisted sometimes by a light land-air from the SE., which will enable her to obtain an offing clear of the shoals before meeting the regular breeze.

Pilots.

Pilots are prompt to answer a signal made for them from any vessel needing their services. Their station is on Protestant cay, close off the town.

Buck island.

Buck island, 340 feet high, lies NE. by E. $\frac{1}{2}$ E. $4\frac{1}{2}$ miles from fort Louisa Augusta, and WNW. $3\frac{1}{3}$ miles from the E. end of Santa Cruz. It is 1 mile in length, E. and W., nearly $\frac{1}{2}$ a mile in breadth, and rises on the southern edge of a dangerous coral bank, which extends westward about $\frac{3}{4}$ of a mile and sweeps round 1 mile N. of the island. There are also several shallow patches as far eastward as $1\frac{1}{4}$ miles.

The island lies directly in the route to the harbor, and should therefore be carefully approached. For this purpose Hams bluff must be kept well open of Barons bluff WSW.; these bluffs in one will lead 2 cables outside the reef, in 4 fathoms water. The channel between the W. end of the reef and the NE. end of Scotch bank is $1\frac{1}{2}$ miles wide. To the westward it leads to the eastern channel into Christiansted harbor, and to the eastward toward Buck island anchorage.

Anchorage.

There is a good anchorage, in 4 fathoms, to the SW. of Buck island, and it is generally chosen by vessels of war. The usual way of approaching it is from the northward, round the W. end of the reef. The latter may be passed by the eye, or by bringing the dwelling-house of Green cay estate (on a mound near the shore) in a line with Sight mill bearing S. by W. $\frac{1}{4}$ W. The mill stands on the centre ridge of hills—which is here lower than elsewhere—and has neither head nor vanes. In running in upon this mark, however, the vessel will cross over 27 or 28 feet water, and

then deepen to 7 fathoms SW. of the island. Soon after passing within the edge of the bank, she may haul up for the anchorage, and anchor when the E. point of Buck island comes open of the sandy point on its S. side

From Green cay the shore of Santa Cruz is skirted by a reef all the way to the E. end. Within it there is snug anchorage for small craft which find their way through a small cut N. of Coakley bay mill, and warp up. With good local knowledge a vessel may enter Buck Island channel from the SE. by running in between the island and the reef skirting Santa Cruz, keeping the N. extreme of Green cay in line with Mount Eagle W. $\frac{1}{2}$ S. The latter from this direction will appear the left of two hills, apparently very nearly of the same height; the northern one is Salt river mound, rising near the shore 2 miles farther eastward. The least water will be $6\frac{1}{2}$ fathoms, the depth generally being 10 fathoms; but great care must be taken to keep the leading mark on until the vessel is abreast of Buck island, when she may haul to the northward.

An extensive bank of soundings, from about 3 to 5 miles broad, stretches off NE. by E. 9 miles from Santa Cruz, curving round Buck Island reef on the N. and W., and passing at about a third of a mile N. of the Scotch bank at about $1\frac{1}{4}$ miles from the shore. On its extreme edge there is one of those remarkable wall-sided narrow coral ledges, which, commencing about 3 miles E. by N. of Buck Island reef, sweeps round in a convex form outward at the extreme E. end, and terminates SSW. 2 miles from the E. end of Santa Cruz; the northern part is from half a mile to a mile broad, and has a depth of from 6 to 10 fathoms on it; the southern portion is from a little more than half a cable to 3 cables broad, and has from 8 to 10 fathoms on it, and in the space between there are from 12 to 17 fathoms.

The shoalest part of the northern ledge bears E. by N. $\frac{1}{2}$ N. $8\frac{1}{2}$ miles from Buck island, and NE. $\frac{1}{2}$ E. 7 miles from the E. end of Santa Cruz, and in heavy weather it breaks and becomes dangerous; it is therefore advisable, under such circumstances, if coming from the southward, not to approach the E. end within 12 miles, and not to bear up before Buck island bears WSW.

The S. coast of the island is bordered by a dangerous,

Buck island
channel.

East End bank.

South coast.

broken, coral reef, which extends from the E. end to nearly abreast of Long point, $3\frac{1}{2}$ miles from the SW. point of the island, where it terminates at the SW. shoal, which has only 1 fathom water on it, with Long point bearing NNW. $\frac{2}{3}$ W. distant nearly $1\frac{1}{4}$ miles. The most dangerous part is from the latter point to Signal hill, 8 miles to the eastward, where it runs along shore more than $1\frac{1}{2}$ miles off. It generally breaks, and, as several shallow patches exist outside, it should be cautiously approached. The 10 fathoms line of soundings is from about a half to $1\frac{1}{2}$ miles southward of the outer part of the reef, and the edge of the bank is very abrupt. There are several cuts through the reef, capable of admitting small coasters into tolerable anchorage within. One of the best is off the entrance of Krausse lagoon. At Great pond bay there is a narrow cut leading into safe anchorage for vessels of 10-feet draught.

From the SW. point of the island a coral bank extends to the southward, having only 3 fathoms of water on it at the distance of $\frac{3}{4}$ of a mile.

This shallow water continues off its SE. side and the shore eastward round Long point. The 5-fathoms line of soundings passes at about $1\frac{3}{4}$ miles from the latter, and nearly a mile southward of SW. point, but on its W. side it is only a cable off. Between the two points temporary anchorage will be found in 7 fathoms water, in case of necessity, and for small vessels farther in at about a mile from shore in 4 fathoms.

Frederichsted. The W. end of Santa Cruz forms a bay, about 5 miles in extent, and near the centre of its shores is the town of Frederichsted. In front of it there is good anchorage in from 6 to 7 fathoms water, with the fort bearing E. by S., and the SW. point S. by W. $\frac{1}{2}$ W. The edge of the bank is not more than half a mile from the shore, consequently in the hurricane season the anchorage is unsafe. Should the wind blow from the westward, as it sometimes does during the fall and winter months, a heavy swell rolls in, making the anchorage uncomfortable and landing difficult.

Shallow water extends a quarter of a mile from the N. point of the bay, and nearly a mile southward of SW. point, the SW. extreme of the island. In rounding the latter point carefully with the lead in not less than 6 or 7 fath-

oms water at the distance of a mile, a vessel should not haul in until the N. point bears N. by E. The edge of the bank lies nearly 3 miles SW. of SW. point, and terminates abruptly; within it is a narrow coral ledge of 7 to 9 fathoms.

There is a fixed *white* light exhibited from a flag-staff on the fort at Frederichsted, said to be visible at a distance of from 4 to 5 miles, but it probably cannot be depended upon at a greater distance than 2 miles. Light.

There is no regular land-breeze at Santa Cruz, but when the trade-wind is light during the day it generally falls calm during the night. Northers, with the accompanying heavy ground-swell, do not appear to reach this island. Winds.

No perceptible tidal stream has been observed at Santa Cruz, but a rise and fall takes place of from 4 to 8 inches, according to the strength of the wind, which will sometimes raise it to 18 inches. It is high water, full and change, at 7^h 30^m. Between this island and St. Thomas there is usually a slight westerly current. Tides.

The islands and cays lying between the Virgin Passage and the east end of Porto Rico are called the Passage islands. They belong to Spain, and are dependencies of Porto Rico. Passage islands.

The island of Culebra, sometimes also called Carlit and Serpent island, is about 6 miles long ESE. and WNW., and is of a very irregular outline. It is uninhabited, of moderate elevation, broken and rugged, thickly wooded, with scarcely a level spot on the surface, and near the centre rises to the height of 650 feet. The northern shore is bold and steep-to, the 20 fathoms line of soundings running parallel to it at the distance of $1\frac{1}{2}$ miles; and $\frac{1}{2}$ a mile within it is a coral ledge with 6 and 8 fathoms water on it, which extends from NE. cay to $1\frac{1}{2}$ miles of the northwest point of Culebra, and within the ledge the water deepens again to 12 and 13 fathoms. Culebra island.

On all other sides there are small islets and reefs which shelter good anchorages, and at the east end there are two excellent harbors.

Northeast cay lies about $\frac{1}{2}$ a mile from the northeast shore of Culebra. It is oval-shaped, $1\frac{1}{4}$ miles long ESE. and WNW., $\frac{1}{2}$ a mile broad in the centre, 340 feet high, and thickly wooded. Three hundred yards north of the east Northeast cay.

end is a remarkable small rocky islet called Bird cay, 60 feet high; and at about a mile to the northeast of this end are the Shark and Whale rocks, two small rocky islets 16 and 10 feet high; SE. 800 yards from these are the Palada cays, two small rocky islets, 80 and 84 feet high, and steep-to.

Culebrita isl-
and.

Culebrita island lies to the southeast of NE. cay, and at about the same distance as the latter from the shore. It is of irregular shape; a mile in length NW. and SE., nearly $\frac{2}{3}$ of a mile in breadth, 260 feet high, and thickly wooded. From the south end a reef, nearly dry, extends in a SSW. direction for $2\frac{1}{2}$ miles, and protects the Sound and Mangrove harbor. At 600 yards from Pond point (the northwest end of the island) lies Davy cay, a small rocky islet 30 feet high.

The Sound.

Excellent anchorage will be found within the cays and islands just described, but the best is toward their southern end under the lee of the reef, in front of Great harbor, called the Sound, a clear space $1\frac{1}{2}$ miles in length and $\frac{1}{2}$ a mile in breadth.

The best anchorage in the Sound is with the extreme west end of Davy cay touching the east end of Bird cay N. by W. $\frac{1}{2}$ W., and the southeast end of Culebrita ENE., in 10 or 12 fathoms water, sand. Here a vessel will be in a good position for weighing, and will be protected by the reef to the southward, which, although broken and scattered, is sufficiently compact to break the sea.

Middle ground.

In the approach to the Sound the space between Culebrita and the main island is somewhat obstructed by the Middle ground, a shoal on which the depth varies from 2 to 5 fathoms; the shallowest part lies about 500 yards from the nearest part of Culebrita.

Good anchorage may also be found north of the Middle ground, with Pond point bearing from E. to E. by N., and Bird cay N. $\frac{3}{4}$ W. Here a vessel will be sheltered by Culebrita, and the reef north of it, and will be in a good berth for getting under way.

Lee channel.

In approaching the Sound from the northward the Lee channel between NE. cay and Culebra is the clearest and best for a steamer, but unless the wind is as far to the northward as NNE., it had better not be attempted by a sailing-vessel, except with the aid of a pilot and on the flood tide.

In proceeding in through the Lee channel, keep midway between NE. cay and the south shore, until nearly abreast of Duck point, when the Culebra side should be kept aboard, to avoid the Middle ground. The bottom is distinctly seen when in less depth than 10 fathoms, and the shoal ground may be avoided by the eye.

Directions.

The Weather channel lies between NE. cay and Culebrita. To enter this channel there are three passages. The southern of these, between Palada cays and Culebrita, is the most direct, but far too difficult for a stranger, as no mark can be given. The second or middle passage is between Palada cays on the one side and the Shark and Whale rocks on the other. The western and safest passage is between the latter rocks and NE. cay. From the latter cay a reef extends to the SE. for $\frac{1}{4}$ of a mile, and from Davy cay a shallow ledge runs off nearly 400 yards, leaving between them the Weather channel, about 300 yards in breadth, and the least depth 23 feet.

Weather chan-
nel.
Passages.

To take the western passage, steer boldly down toward NE. cay, and, having passed the rocks at the distance of rather more than 200 yards, bring the western extreme of Davy cay to touch the extreme of the remarkable bluff at the east end of Culebra. Keep them in one, until the southern sandy beach of NE. cay comes on with the north end of Scrub cay—a small rocky islet, near the north side of Culebra; then bear away SW. by W. and steer for the Dolphin head—a remarkable hill at the east end of Culebra. When Sandy point of Culebrita opens out clear of Pond point, haul up gradually for the bluff, and anchor as most convenient. If going above the Middle ground, keep the Culebra shore rather aboard.

Directions.

By marking the extreme of the shoal extending SE. from NE. cay, with a boat, vessels of the largest size may enter by this channel without difficulty.

It is necessary to observe that the flood sets in from the north, between NE. cay and the Palada cays, at the rate of $1\frac{1}{2}$ knots, and the ebb runs out with equal force in the opposite direction.

Tides.

There is also a passage into the Sound from the southward. Sailing-vessels will seldom have a fair wind into the Sound by this channel, but for a steamer it is safe and easy by observing the following directions:

South channel.

South channel. Bring the eastern edge of Water cay, at the E. end of Culebra, on with the hummock on Culebrita NE. $\frac{1}{2}$ N. This mark will carry a vessel in mid-channel between Yellow shoal and the Reef heads till abreast of Breeze point, when she should steer NE. $\frac{1}{2}$ E. for the anchorage, passing the Reef heads. Porgu heads, which are awash, on the starboard hand. In the channel the depth will be from 8 to 13 fathoms, except, perhaps, on a small knoll of $5\frac{1}{2}$ fathoms SE. of Breeze point.

The hummock above spoken of on Culebrita is a small rocky hill 93 feet high, shaped like a gun-quin, with the thick end to the southward.

Tides. In the South channel the tides run at the rate of 2 knots, the flood to the SW. by S., and the ebb NE. by N.

On the eastern coast of Culebra are three bays communicating with South channel; these are Mangrove harbor, Mosquito bay, and Great harbor.

Mangrove harbor. Mangrove harbor is small but well sheltered. Its entrance lies between Bluff point on the N. and Water and Battle cays on the S. The entrance is about 300 yards wide with a depth of 7 to 8 fathoms, decreasing inside to 5 fathoms, with a bottom of sand and mud. The head of the bay is shallow. In entering the harbor, having rounded Bluff point, steer in midway between the reefs, which are bold and can be seen distinctly, and anchor as convenient. It may not be easy to get out under sail, as the channel trends NW. and SE.

The basin. On the S. side of Mangrove harbor there is a bight about 600 yards long and 200 yards wide, and having a depth of 4 fathoms of water. It is separated from the harbor by a bar with 14 feet of water on it, and is a secure place for a small vessel to anchor.

Mosquito bay. Mosquito bay lies close to the entrance of Great harbor, between Harbor and Breeze points. It is a good temporary anchorage, but, being partially open to the southward, a heavy swell frequently sets in from that quarter.

Great harbor. Great harbor is one of the best and safest harbors in the West Indies. It is about 1 mile long and in some places $\frac{1}{2}$ a mile wide.

The entrance is 200 yards wide, between two bold reefs, and has a depth of 5 fathoms, with from 5 to 7 fathoms inside. Directly opposite the mouth of the harbor are four

coral shoals for which no good leading marks can be given. These are, the Yellow shoal, with only a fathom of water on it and lying $\frac{3}{4}$ of a mile E. by N. from Soldier point; the Shrimp shoal, lying S. by W. $\frac{1}{4}$ of a mile from Breeze point; the Grouper, with 8 feet on it, $\frac{1}{4}$ of a mile WSW. from the Shrimp; and the Snapper shoal, with 1 fathom on it, half-way between Breeze point and the entrance.

These shoals can be seen from aloft, and, to a steamer, are not formidable, as she has only to steer along the reef between Soldier point and the entrance at a distance of 300 yards, and, having passed the shoals, haul in for the entrance to the harbor.

For a sailing-vessel the best channel is between the Grouper and Shrimp shoals. The navigation is, however, too intricate for a stranger without the assistance of a pilot.

The Grampus shoals are a group of small isolated coral heads, with from 3 to 4 fathoms of water on them, rising from a bank with 10 fathoms of water on it, and extending to a distance of 4 miles to SE. of Culebra.

Grampus shoals.

There is a passage between these shoals and the reef which extends to the S. from Culebrita, but no safe directions can be given for it. Large vessels had better pass to the southward of these shoals. For this purpose, if coming from the northward, do not shut in the Palada cays with the E. end of Culebrita till Sail rock bears ENE.

A WSW. course will then lead S. of the bank, and as soon as the leading hummock on Culebrita bears N., a vessel may haul up toward Soldier point. In running to the eastward keep the peak on Southwest cay open S. of Soldier point, till the Palada cays are open E. of Culebrita.

Southwest cay is a mile and a quarter long N. and S., and of irregular shape. From its centre a wooded peak rises 500 feet. All along the eastern side, at 200 yards distance, there is a coral reef, and the Culebra shore is also foul at half this distance.

The channel between the N. point of Southwest cay and Stream point on the Culebra shore is 700 yards wide, with a shoal in the centre on which the least water is 26 feet, with 6 and 7 fathoms of water all around it. The tides sweep through this channel with a velocity of 3 knots, the flood to the S. and the ebb to the northward.

Southwest anchorage. There is good anchorage, with the prevailing winds, between Southwest cay and Culebra. A good berth will be

Scorpion point. found, in 13 fathoms of water, with Scorpion point, which runs out low and terminates in a small pinnacle, bearing E. by S., distance 700 yards.

In fact there is good anchorage anywhere on the lee side of Culebra.

Seine bay. In Seine bay, just to the eastward of Scorpion point, there is a good beach and excellent fishing with the seine.

Snug bay. Snug bay, the next cove to the eastward, is a good boat-harbor.

The channels between the NW. point of Culebra and the cays and rocks to the westward are clear and easy to navigate, as all the dangers are apparent to the eye.

Pilot Rock channel. Pilot Rock channel, between the NW. point of Culebra and Pilot rock, is nearly $\frac{1}{2}$ a mile wide, with a depth of 12 fathoms. All that is to be done in taking this channel is to avoid the reef, seen running off 300 yards from the point, and steep-to. Pilot rock is barren, 30 feet high, 100 yards in diameter, bold, and steep-to.

Twin pass. Twin pass is formed by the Pilot rock and the Twins; the latter are two small barren rocky islets, about 20 feet high, lying close to each other about $\frac{3}{4}$ of a mile westward of the Pilot. At a quarter of a mile SE. from the Twins is a rock awash, named High breaker, and steep-to. The best channel is between it and the Pilot, as there is generally a leading wind through either way.

Fungy Bowt channel. WNW., 700 yards from the Twins, is Fungy Bowt, a remarkable, barren, round, whitish rock, 145 feet high, with rugged perpendicular sides. The channel between is clear and safe, but be careful of a small head 200 yards westward of the Twins, and on which the depth is only 1 fathom.

Washer passage. Washer passage is between Fungy Bowt and the Washer, a small rock only 2 feet out of water, lying NW. by N. two-thirds of a mile from Fungy Bowt. This channel is bold and clear, with a depth of 14 and 15 fathoms in it. A vessel may also pass to the westward of the Washer, which is bold and steep-to.

After passing to the southward of Fungy Bowt, another chain of small islets will be observed lying to the WNW. of Southwest cay.

The three islets nearest Southwest cay are the Sisters, all nearly of the same size, about 35 feet in height, and not more than a quarter of a mile apart. The two western appear in one when bearing S. by E., consequently when on that line the three islets appear as only two. The eastern one is 700 yards from the NW. point of Southwest cay, with a clear channel between.

The Sisters.

Cross cay lies nearly $1\frac{1}{4}$ miles westward of the Sisters. The cay is narrow, half a mile in length, and its central part projects to the NE. nearly $\frac{1}{2}$ of a mile, thus forming three legs; it is 130 feet high, and covered with long grass and bushes. At about midway in the channel between it and the Sisters is the Black rock, a small islet 15 feet high.

Cross cay.

Cactus cay, 95 feet high, is the westernmost of this small chain of islets, and lies NW. by W. about $\frac{3}{4}$ of a mile from Cross cay. At its S. end there is a remarkable pillar-shaped rock 75 feet high.

Cactus cay.

The channels between the cays of which we have just spoken are all clear and free of hidden dangers; all the rocks are steep-to. For sailing-vessels, however, the best passages are to the westward of the Sister cays, for under the high land of SW. cay the wind is apt to be variable.

In all of these channels the flood-tide runs to the southward at the rate of about 1 mile an hour, and the ebb in the contrary direction at the same rate. It is high water, full and change, at 9^h 0^m. The rise and fall seldom exceed a foot, and, as is the case near the islands of St. Thomas and St. Johns, the mean level of the sea is about a foot lower in April and May than during the remainder of the year.

Tides.

The flood coming in from the northward sweeps round the bluff and over the reef to the SW. of Culebrita at the rate of about 2 knots at the springs; it there slackens its pace, and, meeting the stream setting down on the western side of Culebra, it then trends to the southward toward the E. end of Vieques or Crab island.

The ebb sets over the Culebrita reef, taking the lee and weather channels out of the sound in a reverse direction, and much at the same rate.

On the W. side of Culebra the stream of flood, having reached SW. cay, runs to the SSE. toward the E. end of Bieques.

The channels lying between Cactus cay and the Washer on the E. and the coast of Porto Rico on the W. have not been accurately surveyed. All the information attainable with regard to them will be found in the previous chapter.

Vieques or Crab island.

Vieques or Crab island is 18 miles long E. and W. and from 2 to 4 miles broad. A ridge of small hills runs nearly its whole length along the middle of the island, and rises to a moderate height, named mount Pirate, at Vaca point, the SW. extremity of the island. The E. end of the island bears S. $\frac{3}{4}$ E. about 8 miles from Soldier point; Culebra and Arenas point, the NW. extreme, bears SE. $\frac{3}{4}$ S. $5\frac{1}{2}$ miles from the western point of Bahia Honda, the nearest part of Puerto Rico. Between Vieques and Culebra the soundings are regular and the depth from 12 to 16 fathoms. The E. end of the island is low, bold, and steep-to, and on the S. side the edge of soundings runs along at the distance of about $1\frac{1}{2}$ miles.

The S. coast of the island is indented by several small bays and is free from danger.

Danes bay.

Danes bay, the first of any consequence, is about 2 miles from the E. end. It is a little more than $\frac{1}{2}$ a mile wide, about the same deep, and carries from 3 to 4 fathoms over sandy bottom. Nearly abreast the bay, about $\frac{1}{4}$ of a mile from the points, are two small islets, which may be passed on either side.*

To the westward of Danes bay there are several anchorages for small vessels: Grand port, Man-of-War cay, Tapoon creek, Port Ferro harbor, and Mosquito bay. At the entrance of port Ferro there are 10 feet of water, increasing to 17 feet inside.

Sound or Settlement bay.

To the west of these small harbors and 5 miles E. of mount Pirate is Sound or Settlement bay, about $\frac{3}{4}$ of a mile deep and defended by a small fort. In front of it are two small islets called Soldier and Water cays; the latter, which is the outermost, lies nearly a mile westward of the SE. point of the bay, and about $\frac{1}{2}$ a mile from the shore. On the W. side, within a $\frac{1}{4}$ of a mile of it, there is anchorage in 4 or 5 fathoms water.

Arenas point.

From Vaca point the W. side of Bieques trends about NW. by N. 3 miles to Arenas point. The edge of soundings

* Lieut. Lawrence, R. N.

is here about 4 miles distant, and the shore bold and steep to as far as the S. end of the sandy beach, which forms the NW. extremity of the island. Here a spit of sand runs off NW. by N. for 3 miles from Arenas point, upon which are several spots of only 10 feet water; those at its extremity are covered with dark weed, but, not being sufficiently discolored to be easily distinguished, are very dangerous.

To avoid the N. end of this spit do not open Cape Mala Pascua of Naranjo point at Puerto Rico, and when El Yunque or Anvil peak is shut in with the hill on the western headland of Bahia Honda NW. by W. a vessel will be to the eastward of it.

There is good anchorage under the W. side of Vieques in 5 fathoms water, with Arenas point ENE. and the SW. point of the island about SE. Toward the SW. point the bottom is rocky, and the soundings irregular. Anchorage.

Port Mula is a small bight nearly in the centre of the N. coast of Vieques island. At the mouth of a small creek on the S. side of the bight is a village of about 1,000 inhabitants, which is the residence of the governor, a subordinate of the governor of Porto Rico. A short distance back of the village is a hill called mount Soldat. Port Mula.

Small vessels may anchor in 3 fathoms of water, with the centre of the village bearing SE. and the N. point of the bay ENE.

In fine weather larger vessels may anchor outside in 5 fathoms, with the N. point of the bay bearing SE. about $\frac{1}{2}$ a mile distant.

There are three dangerous shoals lying northwesterly from port Mula about $1\frac{1}{2}$ miles from the shore, called the Caballo Blanco, the Corona, and the Mosquito shoals. All three of these shoals are awash, or nearly so. Mula shoals.

The Caballo Blanco bears NW. $\frac{1}{2}$ W. $1\frac{1}{2}$ miles from the N. point of port Mula, the Corona is WSW. $1\frac{1}{2}$ miles from the Caballo Blanco, and the Mosquito $\frac{1}{2}$ a mile WSW. from the Corona.

S. $\frac{1}{2}$ E. of the Caballo Blanco and midway between it and the shore there is a small coral head with 16 feet of water on it. A similar one, with the same depth of water on it, lies 500 yards S. of the Corona shoal, and a third, also with 16 feet of water on it, lying $\frac{1}{2}$ a mile W. of the Mosquito shoals.

Directions.

In approaching port Mula from the eastward, after getting abreast of point Caballo Colorado, the northern extreme of the island, the coast should be skirted at the distance of $\frac{1}{2}$ a mile till arriving at point Mula, which should be rounded at a distance of 600 yards, when a convenient anchorage may be picked out, with the village bearing about SE. This course will lead between the Caballo Blanco and the coast of the island.

A vessel intending to pass to the northward of these shoals should not bring Arenas point to the westward of SW. by W., cape Mala Pascua to the westward of SW. by W. $\frac{1}{2}$ W., or Caballo Colorado point to the eastward of E. by S. $\frac{1}{2}$ S. while in this vicinity.

Caballo Colorado point.

Diavolo point.

Red rock.

Caballo Colorado point is rocky and steep-to. Half-way between this point and Diavolo point, 4 miles to the eastward, there is close in shore a small rock called Rouge or Red rock. East of this rock the coast is clear, but to the westward it is skirted by a reef.

Half a mile N. of Diavolo point there is a dangerous coral head, nearly awash, called Cockroach rock.

Pelican harbor.

From Diavolo point to the E. end of Vieques the shore is irregular. E. 1 mile from the point and about $\frac{1}{4}$ of a mile from the shore is Pelican cay, from whence a broken reef runs parallel with the shore for $1\frac{1}{2}$ miles; through it are several small cuts of 12 feet water, leading into snug anchorage for coasters.

CHAPTER X.

THE WINDWARD ISLANDS, SOMBRERO TO TOBAGO INCLUSIVE

Variation in 1876:

Sombrero, $0^{\circ} 0'$.	Grenada, $1^{\circ} 20' E.$
The Saintes, $0^{\circ} 10' E.$	Barbados, $0^{\circ} 35' E.$

SOMBRERO.

The island of Sombrero is a sterile rock about $\frac{3}{4}$ of a mile long NNE. and SSW., 300 yards wide, and about 20 feet high at its northern end, rising by two distinct steps to the middle of the island, where it is 37 feet high. It lies nearly in the middle of the Anegada passage, being 47 miles from the east point of Anegada island and 22 miles from the edge of the Anguilla bank to the SE.

Phosphate of lime for fertilizing purposes is shipped from here, the deposit being worked by a company.

The sides of this island are precipitous and rocky, and quite inaccessible except at a little bight on its W. side, $\frac{1}{4}$ of a mile from the S. end and a short distance to the southward of a small rock awash, where, under very favorable circumstances, by watching an opportunity, a person may jump on to a flat ledge of the cliff and with some difficulty climb to the summit.

Birds, which formerly were very numerous, have nearly forsaken the island.

A *revolving white* light, attaining its greatest brilliancy *every minute*, is exhibited at a height of 150 feet above the sea and is visible from a distance of 20 miles. Light.

The light-house is an open frame-work, built of iron, 132 feet high and painted red. It stands about $\frac{1}{3}$ the length of the island from the southern point and about 60 yards from the cliff on the SE. side.

The island belongs to Great Britain.

There is anchorage on the W. side of the island in 6 and 7 fathoms close to the rocks, also in from 10 to 14 fathoms, and heavy moorings are laid down for the vessels that ship Anchorage.

the produce of the quarries. The prevailing winds are from NNE. to S. by E.; westerly winds seldom blow home.

Before this light was established many vessels in attempting to pass through this entrance to the Caribbean sea were lost by being set to the westward on to the reefs surrounding Anegada. Now, however, this channel may be navigated with perfect safety.

Anguilla, St.
Martin, and St.
Bartholomew.

The islands of Anguilla, St. Martin, and St. Bartholomew, (commonly called St. Barts,) with Dog island and other islets adjacent, may be considered as a separate group. They rise from an extensive bank of irregular shape, extending, as shown on the chart, in some places 25 to 27 miles outside of the islands. On this bank the bottom consists principally of shells, gray and white sand, with a little coral and crust. This last substance appears to be peculiar to the Caribbean sea. It seems to be a very small, thin, flat marine plant of somewhat circular outline, with corrugated edges, and, being incrustated with hard lime, has somewhat the appearance of a white flat stone.

The island of Anguilla belongs to the English, and is attached to the government of Antigua. The chief magistrate resides at the little village at Crocus bay, on the western side of the island.

The island is about 14 miles long NE. by E. and SW. by W., and from 2 to 3 miles wide in its widest part. Near the centre of the island the land is about 213 feet high, but there are no remarkable hills. The SW. end is only 30 feet high.

The southern shore as far to the westward as Rendezvous bay is fringed by a coral reef from 1 to 2 cables off shore. The reef is dry in many places, but has several cuts through it which will admit boats of large size into good shelter.

Rendezvous
bay.

Rendezvous bay on the southern shore affords good shelter to small vessels. In entering the bay give a berth to the reef, which extends $\frac{1}{4}$ of a mile off Shaddock point, the eastern limit of the bay. It can be seen from aloft. From Blowing point, about a mile eastward of Shaddock point, there is a road leading to the two anchorages, Road and Crocus bay, on the western coast.

Blowing rock.

Blowing rock is a small rocky islet, about 6 feet above the level of the sea, lying SE. by E. $\frac{3}{4}$ of a mile from the W. end

of Anguilla; it is bold and steep to outside, but within it there is only a channel for boats.

Anguillita is a small rocky cay, 20 feet high, and covered with bushes. It lies $\frac{1}{4}$ of a mile WSW. of the western point of Anguilla, to which it is almost connected by a range of coral heads, with boat-passages only between them. It is steep to on the SW. side.

Anguillita.

South Wager is a small barren rock, steep to, about 20 feet high, lying 2 cables from the northern shore of Anguilla and $1\frac{1}{4}$ miles from the western end of the island.

South Wager.

From abreast the South Wager to Mead point, the eastern end of Long bay, the shore is clear of danger. From Mead point eastward for $2\frac{1}{4}$ miles to Road bay the coast is composed of perpendicular cliffs 150 feet high.

The Dowling shoal is about $1\frac{1}{2}$ miles in extent east and west, and $\frac{3}{4}$ of a mile north and south. Its western edge lies north of Mead point, the channel between, which is about $\frac{3}{4}$ of a mile wide, carrying a depth of from 7 to 10 fathoms. Small vessels leaving Road bay may run through it, but in beating up from the westward it is better to keep outside the shoal. Fork mountain, in St. Martin, in line with Mead point bearing SSE., leads nearly $\frac{1}{2}$ a mile westward of the shoal.

Dowling shoal and islet.

On the northern edge of the shoal there is a small rocky islet of the same name, 4 feet above the sea, and steep to on the NW., but foul to the distance of $\frac{1}{4}$ of a mile to the NE. At nearly $\frac{1}{2}$ a mile ESE. of the islet, on the eastern edge of the shoal, is a small, low, sandy cay, called Sandy island, covered with brush-wood to the height of 6 feet. There is no safe channel between, and to the south and southeast it is foul for more than $\frac{1}{3}$ of a mile. Sandy island bears WNW. $1\frac{1}{4}$ miles from Road Bay bluff, with a clear passage between.

Sandy island.

Road bay is a small bight about $\frac{3}{4}$ of a mile deep, affording good anchorage for small vessels.

Road bay.

On the narrow ridge of sand at the head of the bay there is a small village, and back of it an extensive salt-pond. There is no danger in the bay. The bluff point to the northward is steep to, and a vessel may anchor as convenient. From Road Bay bluff the coast continues to the NE. for 2 miles, bold and steep as far the little valley at the head of Crocus bay, the bluff's being skirted here by a sandy beach.

Thence it turns to the NNW., forming the east side of Crocus bay.

Crocus bay.

The shore of Crocus bay is formed by perpendicular white wooded cliffs. The bay is limited to the northward by Flat Cap point, so called from its terminating in a small flat-topped rock.

The principal settlement is in the southeast corner of the bay, and the houses are scattered about the valley and adjacent hills. The custom-house, with its flag-staff, stands on the south side of the bay, on the summit of a hill 213 feet high, the loftiest in the island. The best landing-place is a little to the northward of the road leading up the valley, but there is always a heavy surf on the beach.

Five - Fathom patch.

In the middle of Crocus bay, and SW. about $\frac{3}{4}$ of a mile from Flat Cap point, lies a coral patch of 5 fathoms, about 2 cables in extent, which should be avoided when anchoring. The marks for it are the Jewel, (a small rock lying close to the shore, $\frac{1}{2}$ a mile to the northeastward of Flat Cap point,) seen just open of that point, and a remarkable large tamarind-tree on the north side of the landing-place, in one with a conspicuous white house on the lowest part of the hill above the beach, E. by S. $\frac{1}{2}$ S.

Supplies.

Fresh provisions and fire-wood may be obtained at Crocus bay, but no water. Yams are abundant, and of excellent quality.

Anchorage.

A good berth will be found with Flat Cap point bearing NNE. and the custom-house SE. $\frac{1}{2}$ E. in 7 fathoms water, sandy bottom, but excellent holding-ground. The bay is open to the westward, but winds seldom blow from that quarter. Heavy rollers, however, frequently set in with violence, making the anchorage rough and landing difficult.

Directions.

A stranger bound to either Crocus or Road bay had better run to leeward of Dog island and beat up. If from the east or southeast, run through the clear bold channel between Anguilla and St. Martin, haul round Anguillita, and act in the same way. There will be no difficulty in doing this; there is seldom any current; the water is smooth, and if overtaken by night good anchorage will be found anywhere under the south side of the cays and reefs northwest of Crocus bay, taking care, however, to avoid the Dowling

shoal. Vessels when leaving the bays and bound to windward, with the assistance of a pilot, may take the northern channel.

This opening is between the east end of Seal islands reef and Flat Cap point, and is $1\frac{3}{4}$ miles wide. Nearly, however, in the centre, but rather nearer Anguilla, there is a dangerous narrow ledge, named Middle bank, $\frac{1}{2}$ a mile long NE. by N. and SW. by S., on which the depth is from 20 to 24 feet. The bottom is distinctly seen on this bank, and with the heavy sea which generally prevails here in the winter season it frequently breaks and becomes dangerous, as no good marks can be given, although there is a clear channel on either side.

Marks are given on the plan to pass to the northward of the bank, but they can only be of use to those possessing a local knowledge of the place. Its south end lies about north $\frac{3}{4}$ of a mile from Flat Cap point, and its north end ESE. about 1 mile from the east end of Seal Islands reef. The south side of the east end of the Seal Islands reef breaks in heavy weather and is steep-to, but foul ground extends out a quarter of a mile from its northeast side, and is extremely dangerous. If approaching from the northward, with a view to enter this channel, its entrance may be approached by bringing the custom-house in line with the western peak on St. Martin; which mark will lead in about 1 mile to windward of Seal Islands reef.

A strong weather or easterly current will sometimes be found in Crocus bay, to which a vessel will swing even in fresh winds; but there is no perceptible tide.

Current.

Two miles ENE. of Flat Cap point, the W. end of a dry reef commences, trending along shore to the northeastward nearly 1 mile out from the shore; 4 miles from the point, and $\frac{1}{2}$ a mile outside the main body of the reef, there is a dangerous rock, named the Shawl, which does not always break, and is steep-to. The shore thence continues foul to within 1 mile of Snake point, the NE. end of Anguilla. In beating up, the vessel's safety will be insured when approaching this reef and rock by proper attention to the lead; for here the 20-fathom line of soundings runs along at $1\frac{1}{2}$ miles from the shore, decreasing suddenly.

Shawl rock.

Within the reef, at the W. end, there is good shelter for

a boat, and through a narrow intricate opening near the E end droghers find an anchorage.

Scrub island.

Scrub island (called by Spanish navigators Anguillita) is separated from Anguilla by a narrow channel of deep water about $\frac{1}{4}$ of a mile wide; but it should not be navigated, as its western side is skirted by a reef nearly dry to the distance of a cable, upon which a vessel may be forced by the sudden flaws which come off the lee side of all these islands.

This island is 2 miles long and $\frac{1}{2}$ a mile broad. It is covered with brush-wood and stunted trees, which, at the W. end, are about 50 feet above the level of the sea. The E. end is low, and from it extends a narrow strip of low rocks to the distance of $\frac{1}{2}$ a mile. They are 8 or 10 feet high, steep-to, and in general the sea breaks violently over them, but in approaching them from the NE. they are hidden under the high part of the island, and are exceedingly dangerous, for the soundings are so deep, the depth being 27 fathoms within $\frac{1}{2}$ a mile of them, that the lead will scarcely give warning.

Near the centre of the N. shore of Scrub island there is a little hill of white sandstone, which, when the sun shines on it, is very conspicuous. There is tolerable landing on the beach at the NW. end of the island, and good shooting.

Little Scrub island.

Little Scrub island lies about $\frac{3}{4}$ of a mile westward of the above hill, and is equally conspicuous from the contrast in color, it being a barren, precipitous, black rock 40 feet high, bold and steep-to.

Dog island.

Dog island is the westernmost of a group of small islets and cays extending westward from the NW. side of Anguilla, and lies NNW. $\frac{3}{4}$ W. $8\frac{1}{2}$ miles from Anguillita, and W. by N. $\frac{1}{2}$ N. $10\frac{1}{2}$ miles from Flat Cap point. It is $1\frac{1}{2}$ miles long E. and W., in the centre $\frac{3}{4}$ of a mile broad, and about 80 feet high; and thence tapers gradually to points at its extreme ends. It is covered with brush-wood and grass, affording pasturage to an excellent breed of horses and sheep, which are tended by two or three of the inhabitants of Anguilla; there is consequently water on the island.

The E. end and S. sides of Dog island are bold and steep-to. At 2 cables from the centre of the southern shore there is a remarkable small black rock, named Bay rock, 4 feet above the sea; and nearly abreast of it, just within the

bluff rocky point which forms the S. extreme of the island, is the landing-place. The W. end of the island is formed by a high perpendicular cliff, and from it a broken ledge of rocks extends $\frac{3}{4}$ of a mile to the westward, and terminates at a small, low, rocky islet, called West cay, 6 feet above the sea, bold and steep-to on its western side.

From West cay the ledge of broken rocks continues to sweep round the N. side of the island to the E. end. Near the centre, at $\frac{1}{4}$ of a mile from the shore is Middle cay, a small barren islet, its NE. side being a bold perpendicular black cliff, 60 feet high. It stands on the edge of the ledge, and on the very brink of soundings; there is no bottom with 100 fathoms line within 1 mile of it.

At a mile to the eastward of Middle cay and similarly situated is another small, low, rocky islet named East cay, covered with brush-wood and equally steep-to on its N. side.

In the day-time West cay may be passed within $\frac{1}{4}$ of a mile without fear, but in the night it should be approached very guardedly, for the soundings are so deep alongside it that the lead will be of little use; within a mile of the cay the depth is from 17 to 20 fathoms.

Prickly Pear cays are two small islets lying E. and W. of each other, and separated by a small boat-channel. The western cay is a narrow rugged rock $\frac{3}{4}$ of a mile in length, covered with brush-wood to the height of 25 feet, upon which there is no landing. The eastern cay is a little lower, slightly wooded, with sandy shores, and about $\frac{1}{2}$ a mile long and $\frac{1}{4}$ of a mile broad; landing may be effected here with care, in a little bight on the W. side.

Between Prickly Pear cays and Dog island there is a clear channel $2\frac{1}{2}$ miles wide, with a depth in it of from 9 to 10 fathoms to within $\frac{1}{2}$ a mile of the western Prickly Pear, when the soundings become so irregular that in strong winds, especially when accompanied by rollers, the sea tops and frequently breaks. It will, therefore, be always better to pass to the westward of Dog island, except with a free wind and smooth sea.

Flirt Rocks are two small rocky islets; the northwestern, lying about $\frac{3}{4}$ of a mile northward of the Prickly Pear cays,

is 20 feet high, the other 8 or 10 feet. They are foul all around, but only to a short distance.

Seal reef and island.

Seal reef commences a short distance eastward of the Flirt rocks and continues in an unbroken line for about 5 miles to the eastward, its eastern point forming one side of the northern entrance into Crocus bay. On the N. side it is bold, steep-to, and dangerous of approach in the night-time nearer than 4 miles. At this distance there are 18 fathoms of water, but nearer than this the depths are irregular, and there are 14 to 16 fathoms close up to the reef. On the S. side there are numerous detached shoals and coral heads, extending $\frac{3}{4}$ of a mile from the reef.

About $1\frac{1}{2}$ miles to the eastward of the Flirt rocks are several low, rocky islets, called the Seal islands, about 5 or 6 feet above the level of the sea.

North Wager rock.

North Wager is a small, black, square rock, about 3 feet high, lying on the S. side of Seal Islands reef, $\frac{3}{4}$ of a mile to the eastward of the Prickly Pear cays. In beating up to Crocus bay, it serves as a guide when approaching the reef, and a vessel should not stand within or to the northward of it.

To the southward of the North Wager, from Prickly Pear cays to Crocus bay, there is excellent anchorage in 9 or 10 fathoms water, over sandy bottom, and out of the influence of the rollers.

Anguilla and the small islands and cays just described are so low that when approaching them from the northward at night it is extremely difficult to estimate correctly the distance from them on account of their being backed by the high land of St. Martin. From this cause vessels have frequently gone ashore on the N. side of Anguilla.

By proper attention to the lead, however, this danger may be easily avoided.

Tides.

At all the islands of this group, viz, St. Bartholomew, St. Martin, Anguilla, and Dog island, there is a rise and fall of from 1 to 2 feet, but the periods are so irregular that the exact time of high water cannot be correctly defined. The following observations, made by Dr. Fahlberg, a resident of these islands for a long period, are valuable, and no doubt give the best information on the subject:

“About St. Bartholomew the flood, at full and change,

runs SE., and it is then generally high water at 10.30 p. m., while the sun is farthest to the N. of the equator; but comes about two hours sooner in the succeeding months, until the sun gets farthest to the S., when it is high water at 10.30 a. m., and it runs afterward in the same proportion back again. The winds, which are of long continuance, sometimes make a trifling difference. The sea is always lowest at the time when the sun is farthest to the N., and the contrary."

During the surveys of these islands, which were conducted during the winter season, between the months of November and March, by Capt. E. Barnett, R. N., neither tidal stream nor current were detected; except on one or two occasions, when at anchor in Crocus bay, on the N. side of Anguilla, a strong easterly or weather set was observed; and on one occasion to the eastward of St. Bartholomew, after a long period of strong trade-wind, a westerly set ran for a short time 1 mile an hour; but in general no difficulty was found in beating up from one island to the other.

The island of St. Martin lies to the southward of Anguilla and is separated from it by a channel about 4 miles wide. St. Martin.

It is very irregular in outline, the shores being deeply indented by numerous bays and creeks, some of which afford good anchorage. The NW. part of the island, with a population of about 4,000, belongs to the French, and is attached to the government of Guadeloupe, and the remainder to the Dutch, with 2,820 inhabitants in 1872.

A ridge of table-land extends through the island from N. to S. and is about 1,360 feet high. Besides this ridge there are several noticeable elevations, among which are the Saddle or Red hill, 377 feet high, at the W. end of the island; Morne de la Fortune, a conical peak forming a bold promontory on the E. side of Simson lagoon; the southernmost bare rocky peak of the western range of hills, 900 feet high, and the conical hill, 697 feet high, surmounted by fort Willem, on the W. side of Grande bay.

The W. end of the island terminates in a dangerous, low, sandy point. The NE. end is high and bold; and being separated from the main ridge by a deep broad valley, when seen at a distance from the WNW. or ESE. it has the appearance of a separate island. The SE. end is formed by a

high bluff, faced by a perpendicular white cliff, from which it receives the name of Blanche or White point.

Grande bay.

Immediately to the westward of Blanche point is the entrance to Grande bay. The western side of the entrance is formed by a rocky ridge 104 feet high, on the end of which are the ruins of fort Amsterdam and the barracks.

Grande bay is the most frequented anchorage in the Dutch part of the island. At the head of the bay, on a low sandy ridge, is the town of Philipsbourg, the seat of government, and back of it an extensive salt-pond, affording large quantities of salt.

A sandy ridge, with from 6 to 10 feet of water on it, runs across the bay in about a NW. and SE. direction, dividing the anchorage into two parts. Inside this ridge there are from 12 to 15 feet of water. There are two cuts across this bar, with 11 feet of water in them, one at each end, but no directions can be given for them, as the opening shifts.

The entrance is free of danger. A fixed *white* light is shown from fort Amsterdam, 150 feet above the sea. In clear weather it should be seen 8 miles. The best anchorage will be found in 6 fathoms of water, good holding-ground, with Blanche point bearing ESE. and the governor's flag-staff at the eastern end of the town N. by E. $\frac{1}{2}$ E. A heavy sea frequently sets in here, causing a high surf on the beach.

In approaching the bay care must be taken to avoid the *Prosélyte*, or Man-of-War rock, a dangerous coral ledge, only 35 yards in extent, having $2\frac{1}{4}$ fathoms of water on it, which seldom breaks. It lies S. $1\frac{1}{4}$ miles from fort Amsterdam point, directly in line with fort Willem, on the conical hill on the W. side of the bay, and the ruins of Fort Amsterdam. In approaching from the SE. keep fort Amsterdam open to the left of fort Willem, and in working up inshore from the westward, when approaching the rock, do not open the Grouper to the left or northward of the highest hill at the E. end of St. Bartholomew. When leaving the anchorage, the governor's staff in one with the Oosten Berg, bearing NE. by N., will lead out clear to the westward of the rock, and when the Grouper comes open to the north-

ward of St. Bartholomew, the vessel may be hauled to the wind.

The S. and SW. sides of this rock lie just inside of the 10-fathom line. A ledge with from 6 to 9 fathoms of water on it runs off $\frac{3}{4}$ of a mile to the SE., serving as a warning when approaching the rock from that quarter.

Another small shoal, having $4\frac{1}{2}$ fathoms of water on it, and therefore to be avoided only by large vessels, lies SW. by W. $\frac{1}{2}$ a mile from Amsterdam point.

From this latter point to Pelican point, $2\frac{1}{4}$ miles to the westward, the coast is formed by small sandy bays separated by wooded bluffs.

Pelican point is low and rocky, and from it a reef with from 2 to 4 fathoms of water on it extends $\frac{1}{2}$ a mile to the southward; 300 yards NW. of the point are the Pelican rocks, 3 or 4 feet above the sea.

Pelican point.

From Pelican point a low sandy shore sweeps round to the westward, forming Simpson bay, which is 1 mile wide and $\frac{1}{2}$ a mile deep, with indifferent anchorage in the centre of it, midway between the points, in $4\frac{1}{2}$ fathoms of water. At the E. end of the bay there is generally a boat-channel into the lagoon, but it is not always open. Thence, to the W. end of the island, the shore is low and bounded by sandy beaches, separated by low rocky and sandy cliffs.

The western extremity of St. Martin is called Terre-Basse point. From it a shallow spit runs off $\frac{3}{4}$ of a mile to the WSW. In rounding it in the night-time great care must be exercised, as the spit is so steep to the lead will give little or no warning of its proximity. In the day-time the shoal may be seen from aloft. If the weather is so cloudy as to make it difficult to see the shoal, keep Fourche island (lying $2\frac{1}{2}$ miles NW. of St. Bartholomew) open to the southward of St. Martin till Terre-Basse point bears to the southward of E.

Terre - Basse
point.

After rounding this point, in proceeding toward Marigot bay, do not come within the depth of 7 fathoms, as this part of the shore is fringed with reefs and sand-banks to the distance of 1 mile from the shore.

About $3\frac{1}{2}$ miles to the eastward of the W. end of St. Martin is Marigot bay, lying between Marigot bluff and Arago point.

Marigot bay.

The bay is $1\frac{1}{2}$ miles wide and $\frac{1}{2}$ a mile deep. It affords good shelter from the usual trade-winds, but is open to the NW. and is exposed to the rollers which sometimes break $\frac{1}{2}$ a mile off shore, sending a heavy surf in to the beach.

The town of Marigot is situated at the head of the bay, and is the seat of government for the French portion of the island.

Landing is inconvenient at all times, and sometimes attended with risk, especially in the night, on account of the numerous sunken rocks which skirt the shore; the best spot is at the extreme E. end of the beach, at the foot of the Fort hill, and having effected a landing, the boat had better lie off at a grapnel. To the eastward of Round hill—which cuts the beach in two nearly in the centre, and is very remarkable—the shore of the bay is skirted by a flat coral ledge.

The only danger in Marigot bay is the Medée shoal. This shoal is circular in shape, about 200 yards in diameter, the least water on it being 15 feet. It lies 800 yards W. by N. from Arago point, with $3\frac{1}{2}$ and 4 fathoms of water in the narrow channel between them. In approaching Marigot bay from the NE., a good course is to bring Round hill in the middle of the southern shore of the bay on with the Morne de la Fortune back of it bearing S. $\frac{1}{2}$ E. and run in on this line, anchoring in 4 fathoms of water, with Marigot bluff bearing W. by S.

As is shown on the plan, Red hill in one with the S. side of Marigot bluff, S. W. $\frac{1}{2}$ W., leads 300 yards northward of of Medée shoal, and the fort in one with mount Accords, SSE. $\frac{3}{4}$ E., leads about the same distance to the SW. The mount is a very remarkable peak, 978 feet high, near the end of the long ridge which runs inland to the southward of the town; there is a smaller elevation outside it, nearer to the sea, but it cannot well be mistaken.

From Arago point to the N. point of St. Martin the shore is clear and steep-to, the soundings regular, and it may be approached to $\frac{1}{2}$ a mile. The most remarkable object on this part of the coast is the Crole rock, a small, barren, black, rocky islet, with a rounded summit, rising on its N. side 120 feet perpendicularly from the sea. It lies about $1\frac{3}{4}$ miles south-westward of the N. point of St. Martin, and 400 yards from

a point adjacent to the rock, almost equally remarkable, from its terminating in a detached conical peak of somewhat greater elevation. To the southward of the rock there is a deep sandy bay named Anse de la Grande Case, which offers secure anchorage for droghers. In entering it they are guided by the eye. From the head of this bay an extensive low valley, in which there are several cultivated salt-ponds, runs across to Baie d'Orient, on the opposite side of the island.

The N. point of St. Martin is skirted by a reef to the distance of 400 yards, but it always shows itself and is steep-to.

Orient bay lies on the northeast side of St. Martin, at about $1\frac{3}{4}$ miles southward of the north point, and its entrance, about $\frac{1}{2}$ a mile wide, is between two small islands surrounded by dry reefs. From Pinels, the northern island, the reef extends off to the distance of nearly $\frac{1}{2}$ a mile. The bay is about 1 mile deep, and vessels sometimes visit it with the assistance of a pilot, but, being exposed to the full force of the trade-wind and heavy sea, it is only secure for droghers or small fore-and-aft vessels, which find shelter at both ends of it. From the southern island the shore becomes foul and dangerous as far to the southward as abreast of Guano cay; nearly midway, however, there is a small cut leading into a well-sheltered creek, called the Oyster pond, furnishing sheltered anchorage with a depth of 10 feet for small vessels.

The entrance channel is so narrow and crooked that the assistance of a pilot is necessary to enter it.

The sea is generally so heavy on the eastern side of St. Martin that the shore should not be approached by large vessels, within the adjacent islets, except in case of necessity. Caution.

Tintamarre island (called also Hat or Flat island) is a small uninhabited island lying 2 miles eastward of the north point of St. Martin. Tintamarre isl-
and.

The north side of the island is formed by a bold rocky cliff, topped with trees, which toward the east end rises almost perpendicular from the sea to the height of 90 feet, and when seen from the eastward is very remarkable; its south and west sides are low and sandy. It is bordered on

all sides but the west by a coral reef, which extends $\frac{1}{4}$ of a mile from the north shore, and $\frac{1}{2}$ a mile from the south, and terminates at that distance at the southwest point of the island. There is tolerable landing in the sandy bay at the west end, and a small vessel will find temporary anchorage at about $\frac{1}{2}$ a mile from this part of the shore in 8 or 9 fathoms water.

The channel between Tintamarre and Pinels island reef is about 1 mile wide, and carries from 10 to 12 fathoms of water. It is obstructed by the Spaniard rock, a small dangerous coral head just beneath the surface. In moderate weather it does not show itself, but with a fresh breeze the sea breaks heavily on it.

It lies a little more than 1 mile WNW. of the northwest end of Tintamarre island, and E. by N. $\frac{1}{2}$ N. $1\frac{1}{4}$ miles, nearly, from the north point of St. Martin. Fort Willem in one with the east end of Pinels island, bearing SSW. $\frac{1}{2}$ W., leads eastward of the rock; the southwest point of Tintamarre in one with the first hollow in the high land at the west end of St. Bartholomew (a very indistinct and difficult mark) leads to the northeast; and the Crole rock just open of the north point of St. Martin leads to the northward. Vessels, therefore, whether running or beating through the channel between St. Martin and Anguilla, have only to be careful when approaching this danger not to shut in the Crole rock.

The channel between St. Martin and St. Bartholomew is free from hidden danger, but is not safe to navigate during the night, as many of the small rocky islets are quite low, and being steep to the lead gives no warning of their vicinity.

Guano cay.

Guano cay lies about $1\frac{1}{2}$ miles NE. by E. $\frac{1}{2}$ E. from Blanche point, and $\frac{1}{2}$ a mile off the nearest part of the shore.

It is a small rocky islet rising almost abruptly from the sea to the height of 100 feet, and is slightly wooded. It is bold to on its southwest and southeast sides, but nearly $\frac{1}{2}$ a mile to the northeast of it there are two small rocks just above the surface of the water, over which the sea breaks heavily.

The Mollibeday rock lies $\frac{1}{2}$ a mile to the eastward of Guano cay, to which it is similar in appearance, its rocky sides, partially wooded, rising boldly 100 feet from the sea.

From this rock a reef extends for $\frac{1}{2}$ a mile to the SE., and ESE. $\frac{1}{4}$ of a mile from it there is a small ledge awash or nearly so.

With these exceptions, there is no hidden danger in this vicinity.

The Hen and Chickens is a cluster of small rocks lying 2 miles E. by N. from Blanche point. These rocks extend $\frac{1}{4}$ of a mile NE. and SW. They are from 4 to 15 feet high above the water and are steep-to.

Between these rocks and those lying off the NW. side of St. Bartholomew the channel is 5 miles wide, the Grouper rocks lying at that distance SW. of the last-named group.

Grouper rocks.

The Great Grouper is a barren islet 150 feet high, much resembling in appearance Mollibeday rock and the Sugar-loaf, off Gustaf harbor.

A coral ledge, partly above water, extends 200 yards off its S. side, leaving a narrow, deep channel between it and the Little Groupers.

The Little Groupers form a cluster of small, black rocks, the southernmost lying $\frac{1}{2}$ a mile SSW. from the Great Grouper.

The southern and northern rocks are 15 feet above the water, but the middle ones are much lower. They are steep-to all around.

Table rock lies nearly 2 miles NE. $\frac{1}{2}$ N. from the Great Grouper. It is a small, rocky islet, nearly barren, 25 feet high and steep-to.

Table rock.

Fourche island lies SE. $1\frac{1}{4}$ miles from Table rock, with a clear passage between them. From this island rise five small conical hills, two of them, the highest and westernmost, 350 feet high. At a distance these two hills, and nearer all five of the hills, appear as separate islets.

Fourche island.

Both at the eastern and the western end of the island there is a small, dry rock, connected with the shore by a ledge. About 200 yards westward of the S. point there is another rock just above water. Everywhere else the island is steep-to.

Vessels may anchor in from 6 to 8 fathoms of water, with the prevailing winds to the SW. of Fourche island.

The Beef-barrel is a small, square, black rock, only 10 feet above the level of the sea, lying W. $1\frac{1}{2}$ miles nearly

The Beef-barrel.

from Colombier point, the NW. end of St. Bartholomew, with a clear channel between it and the 4-fathom patch at about $\frac{1}{2}$ a mile off Colombier bay. It is bold and steep to on all sides but the NW., which is foul to the distance of 200 yards.

Boulanger and
Sail rocks.

Boulanger rock, lying N. $1\frac{1}{2}$ miles from Colombier point, is a small, barren, rugged, rocky islet about 50 feet high, rising abruptly from the sea on all sides. About 400 yards eastward of it will be seen a rock, nearly of the same height, which, from its resemblance to a vessel under sail, is called the Sail rock. They are bold and steep to, and cannot be mistaken.

ST. BARTHOLOMEW OR ST. BART'S.

St. Bartholo-
mew.

The island of St. Bartholomew (frequently called St. Bart's) is a Swedish possession, with a population of about 4,000.

The exports are unimportant, the commerce depending chiefly upon the port being free.

The island is of irregular shape, the coast-line being indented with numerous small bays, separated by rocky headlands. The hills are, compared with the high land of other islands, only moderate in height, the loftiest being only 992 feet high.

Near the E. end of the island are three hills, of about the same height, so placed with regard to each other that when seen from a distance on the bearings SSW., W. by S., NW. by W., and their opposites, only two of them can be seen. The easternmost hill is 992 feet high, the southern one 861 feet, and the northern hill 821 feet. The N. and E. coasts of the island are skirted by a reef extending only a short distance from shore, and which can always be seen.

Sugar loaf rock.

The Sugar-loaf, lying off the western side of St. Bartholomew, is a remarkable small, barren, rocky islet, having the exact form its name imports when seen from any direction, and although similar in appearance to the Grouper rock, its position and greater elevation readily point it out. It lies nearly W. $1\frac{1}{2}$ miles from Gustaf, and is an excellent guide to strangers for finding the entrance of that harbor, which from a distance is not easily made out. It is 180 feet

high, bold and steep-to, except on the N. side, whence a narrow ledge of dry and sunken rocks extends 400 yards in that direction; at its extremity there are two small rocks about 4 feet out of the water, bold and steep-to outside.

Gustaf or Gustavia, on the SW. side of St. Bartholomew, at $1\frac{1}{2}$ miles to the NW. of Nègre point, the S. extreme of the island, is the seat of government, and a free port. The only portion of it, however, that can be called a harbor is the inner part, or little arm of the sea, named the Carénage, which runs into the SE., and on the shores of which the town is built; but it will only admit vessels of 5 or 6 feet draught. The outer harbor or bay is a commodious and safe anchorage, with the prevailing winds, for a few vessels drawing not over 17 feet, but being exposed to the S. and W. it is not secure in the hurricane season. Vessels of larger draught will find temporary anchorage under the SW. side of the island between the Syndare islets and the W. end.

Gustaf harbor.

The Carénage is nearly half a mile long, 220 yards wide at its inner end, and 130 yards at the narrowest part of the entrance. It is bounded on its SW. side by a narrow rocky ridge, terminating at the entrance in a bold headland 136 feet high, on the summit of which is fort Oscar, mounting 4 guns. On its NE. side it is backed by a ridge of more lofty wooded hills, 260 feet high, terminating at the entrance in a precipitous acclivity 170 feet high, crowned by fort Gustaf, which, overlooking the ridge on the opposite side, serves to point out the locality of the harbor to a stranger coming from the southward, for the town is quite out of sight. The outer harbor or bay is confined to a square space of about 3 cables in extent, and may be entered from the SE., S., or W.

The SE. channel to the anchorage lies between the shore and the Saintes, which are three small, low, rugged, rocky islets, in a straight line NNW. and SSE., about 3 cables in length between the extreme points, and not quite that distance from the ridge which forms the SW. side of the Carénage. The two southern islets are nearly connected by a dry ledge of low rocks; the northernmost and smallest lies nearly a cable to the NNW., but there is no passage between. Outside they are bold and steep-to, but from the middle islet a shallow ledge extends toward the bluff of

Southeast channel.

fort Oscar, leaving a channel not $\frac{1}{2}$ a cable wide, and consequently only fit for small steamers having the assistance of a pilot; but no advantage would be obtained commensurate with the risk.

South channel. The South channel lies between the Saintes and the two Syndare islets, which are barren, rugged, lying N. and S. of each other, and separated by a coral ledge, about half a cable long. The northern islet is 98 feet high, and a ledge extends from its N. and E. sides to the distance of about 50 yards, and is easily seen by the discolored water. A ledge also runs out $\frac{1}{2}$ a cable from the SE. end of the southern islet, and upon it are two small rocky islets; the outer one rises from the edge of the ledge, and is bold and steep-to; between it and the NW. Sainte islet is the South channel, which is 2 cables wide.

Baleine or Whale rock. To the westward of the Syndares, 400 yards distant, is a small rock, just awash and steep-to, called the Baleine or Whale rock. The channel between this rock and the Syndares is deep and clear.

West channel. The West channel, formed between the Syndares and the shore, is about $3\frac{1}{2}$ cables wide, and the only danger in it is the shallow ground off the N. end of the northern Syndare, before noticed.

The wind in these channels is apt to be so baffling and variable that sailing vessels had better avail themselves of the services of a pilot, who can always be procured.

Colombier bay, at the NW. end of the island, affords shelter and tolerable anchorage.

Fregatte and Goat islands. Fregatte, and Goat island, or Bon-Homme, are two islands of considerable elevation, clothed with grass and low brushwood, and readily distinguished. The latter is separated from the NW. end of St. Bartholomew by a clear channel $\frac{1}{4}$ of a mile wide, but the sea is generally so heavy that it should not be attempted except in a case of necessity.

Toc Vers. Toc Vers is a small, pointed, rocky islet, lying about $1\frac{1}{2}$ miles from the northern shore of St. Bartholomew. When seen from the E. or W., its north point resembles a lofty pillar standing close by the side of the perpendicular cliff, which is about 120 feet high and very remarkable. It is steep-to on its N. and E. sides.

The deep bight on the N. shore of St. Bartholomew is called St. Jean bay. At the head of the bight there is a cut through the reef large enough to admit coasters.

The Tortue is a small flat-topped rocky islet, lying $\frac{1}{4}$ of a mile from the NE. point of St. Bartholomew, to which it is connected by a ledge of rocks, dry in places. At $\frac{1}{4}$ of a mile to the NE. of the islet are the Grenadiers, a small rocky ledge, only 2 or 3 feet above the level of the sea, on which the sea breaks heavily. It is steep-to on the NE. side.

Tortue rock.

Coco, the southernmost of the islets off the SE. side of St. Bartholomew, lies S. about $\frac{1}{2}$ a mile from the bold, high bluff which forms the E. side of Grande Saline bay. It is a narrow, rugged, rocky islet, slightly wooded on its summit, about $\frac{1}{4}$ of a mile in length N. and S., and has a small rock nearly connected to its N. end. The island is steep-to on all sides, particularly at its S. end, but it is not advisable to pass inshore of it.

Coco islet.

The Roques, or Little Turtle rocks, are two very small rocky heads lying close together, at $\frac{3}{4}$ of a mile to the eastward of Coco island. They are only 3 or 4 feet above the level of the sea, and, although bold and steep-to, are dangerous to vessels passing close to St. Bartholomew in the night, as they lie S. by W. nearly $1\frac{1}{2}$ miles from its E. end. In the day-time they are easily seen by the violent surf breaking over them.

The Roques.

Grande Saline bay, to the NW. of Coco islet, affords temporary anchorage for small vessels. From here to Gustaf harbor the shore is bold and steep-to.

SABA.

The island of Saba, lying SW. by W. 27 miles from Gustaf harbor and belonging to the Dutch, is small, being only $2\frac{1}{4}$ miles in diameter, bold, and steep-to. Its conical summit, 2,820 feet high, is generally hidden by clouds. The island is a mass of rugged mountains intersected by deep and precipitous ravines.

Saba island.

The principal village is situated in a valley, 960 feet above the sea, called by the inhabitants the Bottom, and only visible when Ladder point, the SW. extremity of the island, bears N. by W.

The population in 1872 was 1,883.

The only commerce is in poultry and vegetables, which are exported to the neighboring islands. The islanders speak English, and are excellent ship-builders, their small craft being celebrated throughout the Windward islands.

Landing is generally difficult and sometimes dangerous, from the heavy surf which breaks upon the shore.

The landing most used is not quite $\frac{1}{2}$ a mile eastward of Ladder point, on the S. side of the island, and is called the Southside landing. It is a small rocky cove, from which a pathway leads through a deep ravine up to the village.

Ladder landing is about $\frac{3}{4}$ of a mile northward of Ladder point, on the W. side of the island. It is so called from the pathway which leads from it being cut out of the precipice.

The principal boat-building spot is on the W. side of the island, near the NW. point. Landing may be effected here with moderate trade-winds.

Wood and water are difficult to obtain.

The anchorages off Saba are neither commodious nor particularly safe, as the 100-fathom line runs within 3 cables of the E. side and only $\frac{1}{2}$ a mile off on the western side.

Small sailing-vessels or steamers may anchor temporarily off the Southside landing. Another anchorage, where the bank of soundings is somewhat wider, is on the western side of the island, between Ladder landing and Torrens point. Here a vessel may anchor in 12 or 15 fathoms, sandy bottom, about 2 cables off shore, with the outer part of Torrens point, the NW. extremity of the island, bearing NNE.

The Diamond rock, a small barren islet, 80 feet high, lies off Torrens point, with a clear deep channel between them. Closer to Torrens point is the Pilot, a rock 6 feet high out of water, with a small rock awash just outside of it.

Sailing-vessels should not attempt to anchor at Saba except in case of necessity, as the wind under the high land is almost invariably baffling and flawy. There is no perceptible rise or fall of tides at Saba island.

Saba bank.

The Saba bank is a nearly rectangular bank of soundings, with a depth of from $6\frac{1}{2}$ to 30 fathoms. Its NE. point lies $2\frac{3}{4}$ miles from the SW. point of Saba island. The eastern edge of the bank is formed by a ledge of coral, sand, and

rock nearly 30 miles long, and varying in depth from $6\frac{1}{2}$ to 10 fathoms.

To the westward of this ledge, with the exception of a few small coral patches of 9 and 10 fathoms toward the southern edge, the bottom is clean, white, coral sand, with a depth of water of 12, 15, and 20 fathoms, gradually increasing toward the edge, but running off abruptly from 30 fathoms to deep water. Where the depth is less than 10 fathoms the bottom can be distinctly seen.

The northern edge of the bank affords good fishing, but the barracouta caught here, as well as between the islands of Saba and St. Eustatius, are often found to be poisonous.

There appears to be no tide on the Saba bank and very little current. Tide.

ST. EUSTATIUS.

St. Eustatius, generally called Statia by the inhabitants, St. Eustatius. is a lofty volcanic island 1,950 feet high; its summit, like that of Saba, is generally hidden by clouds. The island is $4\frac{1}{4}$ miles long and 2 miles wide, and when seen from the NE. or SW. at a distance appears like two distinct islands. On the northern part are rugged hills from 500 to 900 feet high; the southern portion is occupied by the volcanic mountain, on the southern side of which is a bold white cliff 900 feet high called the White Wall. The island has been a Dutch colony, with but little interruption, since the year 1600. The lieutenant-governor, who has Saba also under his control, is subordinate to the government of St. Martin.

The population in 1872 was 2,884.

Formerly it was a place of some importance, but its trade now is insignificant. Yams are the principal articles of export, with some sugar, molasses, and rum.

Orange Town, the only town on the island, is on the western shore, partly on the beach and partly on the cliff above it, 130 feet high. The two parts, called the Lower and Upper town, are connected by a road cut in the face of the cliff. Fort Orange stands on a cliff in front of the town.

The only safe landing place is on the beach abreast of the town, and here the surf is frequently so heavy that the boat must be veered in with a long line from a grapnel.

In approaching the anchorage off Orange Town, the only

danger to be avoided is a rock, nearly awash, at the south-west end of the island, $1\frac{1}{2}$ cables off shore, between the White Wall and the town.

The best anchorage is about $3\frac{1}{2}$ cables off shore in 10 fathoms of water, sandy bottom, with the church in the Upper town on with Round hill, back of it, bearing E. by N. $\frac{1}{2}$ N.

The wind hardly ever varies to the northward of NE., or to the southward of E.

The northern part of St. Eustatius is bold, and may be rounded at the distance of a cable; but breakers extend from the southeast side to the distance of 2 cables, and in coming from either quarter it will be better to keep $\frac{1}{2}$ a mile from the shore, to avoid the baffling winds under the high land.

The edge of the bank lies close to the south side of the island; $1\frac{1}{2}$ miles from the north side; $2\frac{1}{2}$ from the northeast side; and 2 miles from the west side, where there is a depth of from 12 to 37 fathoms, gradually deepening. There are a few rocky spots which should be avoided, but generally the bottom is sandy and good holding-ground.

This island, with St. Christopher and Nevis, may be considered as a separate cluster, as they rise from a bank of soundings separated from the adjacent islands by channels of a greater depth than 200 fathoms.

ST. CHRISTOPHER OR ST. KITTS.

Island of St.
Christopher.

The island of St. Christopher, frequently called St. Kitts, is an English colony, and is attached to the government of Antigua. The population in 1870 was 28,420. The island is of volcanic origin; mount Misery, an extinct crater, rising to the height of 4,314 feet. It is 18 miles long, but varies considerably in breadth, the SE. end forming a mountainous peninsula connected to the rest of the island by an isthmus nearly 3 miles long and only $\frac{1}{4}$ of a mile wide. It consequently appears at a short distance as two islands, and farther off the irregular hills at the SE. end will appear as several detached islets.

The NW. end of the island is about 5 miles broad, and the centre part is occupied by a vast rugged mountain-ridge, its lofty summit terminating in mount Misery; at its base, on almost all sides, are extensive table-lands, richly

cultivated, making the island one of the most picturesque in the West Indies. At the SE. end of the ridge, at the back of the town of Basse-Terre, is a striking elevation called Monkey hill, its rounded woody summit being 1,319 feet high; and at the foot of the western side of the mountain, close to the shore, is Brimstone hill, equally conspicuous, 779 feet high, and easily distinguished by the extensive fortifications and signal-staff which crown its summit.

The SE. end of the island, although not so high, has some prominent hills.

St. Anthony's peaks are at the SE. extremity of the island, and are respectively 1,124 and 1,188 feet high.

The Nag's Head, 648 feet high, is a conical hill at the S. point of the island. The Sugar-loaf, $1\frac{1}{4}$ miles to the NW. and 616 feet high, is a well-defined object.

The edge of soundings is distant only from $\frac{1}{2}$ to $2\frac{1}{2}$ miles from the shores of the island; the NE. shore is here and there skirted by a reef, which in places affords temporary shelter for boats and droghers. The bank which connects this island to St. Eustatius is from 4 to 6 miles broad, with a depth of from 15 to 25 fathoms over coral sand and rock.

Basse-Terre, the capital of St. Christopher, is situated on the SW. side of the island, on the shore of a sandy bay nearly $1\frac{1}{2}$ miles in length, and about $\frac{1}{2}$ a mile deep. The best anchorage is off the centre of the town in 8 or 9 fathoms water, with the flag-staff of the Old fort at the W. end of the bay bearing W. by N. No directions are necessary, for there is no danger whatever.

Basse-Terre.

A shallow bank skirts the shore at the distance of 100 yards, frequently causing a heavy surf on the shore.

The West India and Panama Telegraph Company have a station here, a submarine cable connecting this island with Santa Cruz and Antigua.

A fixed *red* light is shown from a wooden tower 37 feet high, on the beach abreast the town of Basse-Terre. Although the light-house lists state that it can be seen from a distance of 12 miles, it is hardly visible more than 4 or 5 miles.

Light.

Old road lies about 5 miles westward of Basse-Terre, and $2\frac{1}{2}$ miles eastward of Brimstone hill. A little eastward of the town there is a temporary anchorage in 9 or 10 fathoms

Old road.

water, stony ground, at a cable from the shore, abreast a rivulet of excellent water.

There is also a similar anchorage a little northward of the small fort, at the foot of Brimstone hill, with the flag-staff on the hill bearing E. $\frac{1}{2}$ N. and the church N. $\frac{1}{2}$ E.; a convenient spot for steamers to land troops or supplies.

Neither of these anchorages is, however, fit for a sailing-vessel, as the wind under the high land is very baffling. In passing to leeward of the island sailing-vessels should keep at least 3 miles off shore to avoid being becalmed or exposed to the very violent gusts which frequently rush down without warning through the ravines.

In rounding the NW. end of St. Christopher in the night-time, a good berth must be given to Belltete or Sandy point, as it is very low and is foul for $\frac{1}{2}$ a mile off shore.

Deep bay.

The N. end of the island has a reef about $1\frac{1}{4}$ miles long protecting the anchorage of Deep bay. The outer edge of the reef lies $\frac{3}{4}$ of a mile off shore, with shallow water a short distance outside of it. Deep bay affords good anchorage for coasters.

Passage between St. Kitts and Nevis.

The channel between St. Christopher and the island of Nevis is called the Narrows. Between Windy Hill point, the NW. extremity of Nevis, and Scotch Bonnet head, the nearest promontory on St. Christopher, the passage is $1\frac{3}{8}$ miles wide and navigable for vessels drawing 18 feet. From the westward, against the trade-winds, it can only be used safely by handy coasting-vessels, as no leading marks can be given for beating, and the off lying shoals are numerous.

A dangerous coral patch lies $1\frac{1}{2}$ miles N. of Mosquito bluff, the eastern extremity of St. Christopher, and about 1 mile from the nearest shore. An equally dangerous coral bar extends more than $2\frac{1}{2}$ miles northwestward from the N. end of Nevis.

The passage lies between these shoals, the 3-fathom limits of which are more than $1\frac{1}{2}$ miles apart.

Booby island.

Booby island is a small, conical, rocky islet, 126 feet high, steep-to except on the SE. side, where a 3 fathom patch extends for a short distance.

To enter this passage keep 3 or 4 miles off shore till Booby island bears S. by W., when steer for it, leaving it on the port hand 2 cables distant, then steering so as to pass about

the same distance northwestward of the Cow rocks, 6 feet high. Westward of them there is no danger.

There are also channels for coasters between these shoals and the shores of the islands, but no good leading marks can be given for them.

There is excellent anchorage in the Narrows, with good holding-ground in 6 fathoms of water, with the Cow rocks bearing about NE. by E., Scotch Bonnet head N. by E. $\frac{1}{4}$ E., and Horseshoe point NW. by W.

NEVIS.

The island of Nevis is nearly circular in shape, 7 miles long N. and S. and $5\frac{3}{4}$ miles wide. It is an English colony, and is attached to the government of Antigua. Nevis island.

In 1870 its population was over 11,000. The formation is volcanic, the highest peak with its crater being 3,586 feet high. This peak is generally hidden by clouds, but several other elevations on the island are visible, and are useful landmarks.

On the S. side of the island, Saddle hill, 1,432 feet high, may be readily made out from its features, except from the ESE. and WNW., when the hummocks are in one; the hill, however, from these points is equally conspicuous. On the E. side of the island are two remarkable wooded peaks, standing on a fork of the mountain, 2,350 feet high.

On the NW. side Hurricane hill, 1,192 feet high, is easily known, being large and massive and terminating in a peak, and having at its base a small detached rounded hill, which forms a prominent bluff at the extreme NW. end of the island, 288 feet high, called Windy hill. With the exception of this point and the base of Saddle hill, the shores are low, and rise gradually to the interior, the plains and slopes being highly cultivated. Charles town, the capital of the island, is situated on the W. side, and has in front of it an excellent anchorage with the prevailing winds, although an open roadstead.

Except on the W. side, between fort Charles and Cades bay, the shore is fringed with a coral reef, and should not be approached within $\frac{3}{4}$ of a mile, or the depth of 10 fathoms.

In approaching the anchorage off Charles town from the southward the lead must be hove quickly, as the 10-fathom line is less than 1 mile off shore and steep-to.

In the day-time, having rounded the S. end of Nevis, if the island of St. Eustatius can be seen, keep it open of Brimstone hill on St. Christopher. This mark will lead clear of the reef on the western side.

When Booby island comes open of the N. side of Nevis, bearing NNE., steer for it. This mark will lead just outside the ledge off fort Charles, and to an anchorage at about $\frac{1}{2}$ a mile off shore, in 5 fathoms water, abreast the flag-staff in the town.

Vessels of large draught approaching the anchorage off Charles town from the NW. must avoid the Monkey shoals, which are the only dangers on this side of Nevis, and lie NW. $4\frac{1}{2}$ miles from fort Charles, and SW. $\frac{1}{2}$ S. $2\frac{1}{2}$ miles from the Nags head, the SW. end of St. Christopher.

Monkey shoals.

These shoals form two small banks of coral and sand, on which there are 4 fathoms water. They lie on the edge of soundings, occupying a space about $\frac{1}{2}$ a mile long NNE. and SSW., and 400 yards broad. The discolored water over them may be seen at some distance from aloft. Paradise mill, at Nevis, in one with the old mill on Tower hill, bearing E. $\frac{3}{4}$ S. (the latter stands well up on the side of the mountain) leads close to the southward of them. Cades Bay mill, (the northwesternmost on the shore,) in line with Spring Hill mill, which stands conspicuously on the ridge connecting Hurricane hill with the mountain, E. $\frac{1}{2}$ S., leads to the northward. Lloyd's staff, at Charles town, in line with Prospect Hill mill, which stands on the top of the western ridge of low hills, SE. $\frac{1}{2}$ E., leads to the westward; and Horse-shoe point, the S. extreme of St. Christopher, in line with St. Anthony peaks NNE. $\frac{1}{4}$ E., leads to the eastward. From the body of the shoals St. Eustatius is seen in one with Brimstone hill and Mosquito bluff, the E. extreme of St. Christopher, just clear over the low land to the northward of the Scotch Bonnet. The soundings around are very irregular.

From the S. side of Nevis, the bank on which this island, with St. Christopher and St. Eustatius are situated, extends SE. by S. $\frac{1}{2}$ S. $10\frac{1}{2}$ miles, terminating abruptly in 17 fathoms, W. $\frac{3}{4}$ N. $8\frac{3}{4}$ miles from Redonda island.

From the S. end of the bank a remarkable coral ledge, about 1 mile in breadth, extends along its SW. edge for a

distance of 5 miles, and has from 9 to 10 fathoms on it, with deeper water within.

Redonda, lying about $18\frac{1}{2}$ miles to the SE. from the peak of Nevis and about NW. 10 miles from Montserrat, is a small, barren, rocky, uninhabited islet, its rounded summit reaching 600 feet above the sea. Off its SE. end there is a small remarkable detached rock, called the Pinnacle. From about 3 miles NNW. of Redonda, a coral bank extends for about 7 miles in a northerly direction; the least water on it is 21 fathoms.

Redonda islet.

MONTSERRAT.

The island of Montserrat, discovered by Columbus during his second voyage, was named by him from its resemblance to the mountain of the same name near Barcelona, which is rugged, uneven, and exhibits many lofty peaks, as its name in the Spanish language implies. The first settlement on the island was formed by the English in 1632, and, with the exception of a short interval, it has remained a British colony attached to the government of Antigua. Its population in 1870 was 8,932.

Montserrat isl.
and.

The island is of volcanic origin, and its lofty heights, clothed with wood to their summits, may, when unclouded, be seen at a distance of about 45 miles; the highest, Soufrière hill, being 3,002 feet above the sea. Its shape is nearly oval, 9 miles long NNW. and SSE., and 5 miles broad, containing an area of about 37 square miles; and its shores are bold, steep, and free of danger. Its E. and NW. sides are precipitous, but the SE. and W. sides slope gradually to the sea, and are highly cultivated. The bank of soundings extends from the S. side about $\frac{1}{4}$ of a mile, increasing in extent on both eastern and western shores to 3 miles at its N. end.

Many springs of excellent water flow into the sea; but, from the surf, watering is attended with difficulty.

Water.

The principal anchorage is off the town of Plymouth, near the SW. point of the island; but it is steep-to, there being 10 fathoms a little more than a cable from the beach, and deepening quickly to 20 fathoms, so that for a large vessel a better berth will be found NW. of the town, in 9 fathoms and about $\frac{1}{2}$ a mile from the shore, with Bransby

Anchorage.

point in line with Redonda island NNW. $\frac{1}{2}$ W., and a water-mill near the beach in line with North George hill NE. by E. $\frac{1}{2}$ E. The town is almost in ruins, and but few supplies can be obtained. Landing is difficult, from the heavy surf on the beach, even in the finest weather. Small vessels may anchor on the W. side of the island, and in Fox, Old road, and Cars bays; there is no anchorage on the weather side. During the hurricane months a vessel should put to sea immediately on the approach of bad weather.

Light.

When the mail-schooner is expected, a *fixed* light is shown from a staff on the beach in front of the town of Plymouth.

Tides.

It is high water, full and change, at Montserrat at 6^h 0^m approx.; springs rise 1 foot 6 inches, neaps 6 inches, but they are irregular. Off the N. and S. points the western stream at times runs 2 knots, the eastern being weak; along its other shores it runs about $\frac{1}{2}$ a knot.

BARBUDA.

The island of Barbuda is $13\frac{1}{2}$ miles long NW. and SE., $7\frac{1}{2}$ miles wide, and contains about 500 inhabitants.

The island is attached to the government of Antigua.

It is only partially cultivated, but quantities of cattle, horses, sheep, and deer are raised.

The N., S., and W. sides of the island are low, sandy, and scantily wooded, with nothing remarkable on them except on the S. side, where about 2 miles from the SW. point there is an old martello tower, in a ruinous state, near the beach, and a little to the eastward of it a remarkable clump of trees, which are useful objects in approaching this side.

From Spanish point, the SE. end of Barbuda, the N. side of which is a white cliff 35 feet high, the eastern shore of the island begins to rise, and about midway, over a space of 2 miles, it is composed of perpendicular cliffs 200 feet in height, and is the highest part of the island. On this side a dry broken coral ledge skirts the shore at the distance of about $\frac{1}{2}$ a mile, upon which the sea breaks with great violence, and it is so steep that there is no bottom with 90 fathoms $1\frac{1}{2}$ miles outside it.

A reef extends nearly $1\frac{1}{2}$ miles from the northern shore, and is also so steep that the depth is 30 fathoms within 1 mile of it; the extreme N. point of the reef, how-

ever, always shows itself. At the northwest end of the island the ledge is composed of detached coral heads which extend out in that direction $2\frac{1}{2}$ miles, and do not break; here, however, the soundings give warning of approach, and a vessel in the night-time, when passing the W. side of the island, should not come within the depth of 10 fathoms.

The W. side of Barbuda is formed by a low narrow sand-ridge scantily wooded, at the back of which is an extensive lagoon carrying from 5 to 12 feet water. The entrance to it lies a short distance to the eastward of Billy point, at the NW. end of the island, but it is obstructed by a bar of mud on which there are only $2\frac{1}{2}$ feet water.

The bank on this side extends for a considerable distance to the westward, the 100-fathom line being 14 miles from the island. This coast is foul in places for 2 miles off shore; there is also a detached patch, with 7 feet water on it, SW. $\frac{1}{2}$ W., 9 cables from Tuson rock; vessels should not approach within the depth of 6 fathoms without caution.

The S. side of Barbuda is by far the most dangerous, and must be approached with extreme caution, for the lead is of little use; indeed, in the night-time it should be avoided, if possible, altogether. From Spanish point a line of detached shoals extends nearly 7 miles in a SW. by S. direction. The Palaster reef is nearly dry and always seen, but the other shoals have a depth of from 8 to 16 feet on them, and never break. Under favorable circumstances, however, the discolored water on them may be seen $\frac{1}{4}$ of a mile off. The westernmost shoals bear from River fort (the old martello tower just noticed) S. 6 miles from Palmetto point S. by E. $\frac{3}{4}$ E., and from the little hill on Spanish point SW. by W. $\frac{1}{4}$ W., but the two latter objects are so far off and so low as to make it difficult to obtain a correct bearing of them from the deck.

This island is connected with Antigua by a bank varying in depth from 7 to 30 fathoms.

No good water can be procured at Barbuda. The inhabitants use rain-water. Fresh provisions and wood can, however, be readily procured and at moderate prices. Supplies.

There is good anchorage on the west side of Barbuda, with the prevailing winds, with Cedar Tree point bearing N. by E., and Palmetto point, the southwest extreme of the island,

SE. $\frac{1}{2}$ S., in 6 fathoms water at about 3 miles off shore. Small vessels may approach much closer abreast Tuson rock, which is 2 feet above water and lies a short distance from the shore.

There is also excellent anchorage on the south side of the island to the westward, and under the lee of the shoals, which shelter it with the wind as far to the southward as SE. The best position for communicating with the island will be found at about half a mile from the shore, with the River fort bearing N. by E., and Palmetto point NW. by W. $\frac{1}{2}$ W., in $5\frac{1}{2}$ fathoms. Be careful, however, when standing in, not to bring the fort to the northward of N. by E. until quite certain that the vessel is to the northward of the shoals.

Both this and the anchorage on the west side of the island are exposed to rollers; but as they take the vessel in the stern, she is eased of the strain on her cable, and rides far more comfortably than if at most of the anchorages about Antigua. At this period, however, landing is attended with great difficulty and risk, for should the boat be thrown ashore broadside on, the next wave would inevitably destroy her. From a short distance to the westward of the River fort as far as the southeast end of the island the beach is skirted by small coral heads, with deep water between, through which the way must be picked to the landing. The clearest spot will be found abreast the fort.

Navigators undertaking to pass between Barbuda and Antigua in the night-time should be very sure of their latitude, as the soundings are so irregular that it would be difficult to tell from them which way to steer.

ANTIGUA.

The island of Antigua was discovered by Columbus on his second voyage in 1493, and was named by him for the church of Santa Maria de la Antigna, in Seville.

It was first settled by the English in 1632, and, with the exception of a short interval from 1666 to 1668, has ever since been an English colony.

The population in 1871 was 35,157, of whom 2,146 were white.

The island is $13\frac{1}{4}$ miles long E. and W., $9\frac{1}{4}$ miles wide, and is of moderate elevation compared with the lofty islands to the southward, so that the heights are but seldom obscured by clouds. The highest mountain is Boggy peak, 1,339 feet high, in the SW. part of the island.

The shores are deeply indented, particularly on the NE. side, where there are many bays and creeks navigable for small vessels.

This end of the island is low, but it rises gradually in height toward its SW. end, where the hills become very irregular and so remarkable as to serve the purpose of guides through the dangerous reefs and shoals which surround almost the whole island. The only clear space is on the S. side between Willoughby bay and Old road, where it is bold and steep-to. Elsewhere it should be approached with great caution and with the lead continually going.

Antigua lies in the middle of the southern edge of an extensive bank of coral and sand, which extends a little northward of Barbuda, on its northeast edge. The bank runs off to the SE. of Antigua to the distance of 5 miles; from Man-of-War point eastward 7 miles, and from thence the edge forms a wave-line to the southeast point of Barbuda. From the west side of Barbuda the edge is about 12 miles distant, and it is the same distance eastward of the St. Bartholomew bank. From about the parallel of the south end of Barbuda the western edge of the bank turns to the SE., forming a deep bight, the bottom of which is 14 miles from the southwest point of that island, and here the bank is only about 12 miles wide.

From Sandy islet, at the entrance of St. Johns, the bank extends westward 12 miles, and terminates abruptly from a depth of 25 fathoms. Thence it turns inward again to the ESE. and the edge comes within 3 miles of the shoals on the west side of the island, then trending outward, terminating to the southwest at $7\frac{1}{2}$ miles from Johnson point.

The east end of Antigua may be said to be formed by Green island, the eastern extreme of which terminates in a bold rocky headland, 170 feet high, called Man-of-War point, which is steep-to, and may be rounded at the distance of 1 mile. The sea generally rolls in so heavily that it should not be approached within this distance, and great caution should be observed when closing with Green island either from the northward or southward.

Ten Pound bay is nearly $\frac{1}{2}$ a mile to the southwest of Man-of-War point, and is unnavigable, from the heavy swell which always rolls in at the entrance. Ricket harbor, at

Bank of sound -
ings.

Green island.

Ten Pound bay.

the southwest end of Green island, affords shelter for droghers under the lee of the reef.

York island.

York island is a small, round, rocky islet, lying $1\frac{1}{4}$ miles southwest of Man-of-War point, at the south side of the southern entrance to Nonsuch bay. This island is nearly connected by dry reefs to the shore of Antigua, which from here takes a SW. direction for $1\frac{1}{2}$ miles, where it terminates in two bold precipitous rocky headlands 215 feet high, very remarkable from the eastward, especially when the morning sun shines on the white cliffs. In this space are the small bays of Marie-galante, Exchange, and Half-Moon. The shore is skirted by a reef, but in moderate weather it may be approached within 1 mile.

From Hudson point, the southernmost of the above headlands, the coast takes a sudden turn about W. by N. for 3 miles, and then runs to the SSE. for $2\frac{1}{2}$ miles, forming a deep bight named Willoughby bay, the north side of which is a remarkable flat, woody, table-land 350 feet high.

Willoughby bay.

Willoughby bay is capable of affording safe anchorage to large vessels, but is so difficult and dangerous of access that it is seldom visited, the produce of this part of the country being sent by droghers to St. Johns. The head of the bay is low and sandy, and its entrance is protected by a coral ledge, dry in many parts, through which there are two cuts; that to the northeast, named Horseshoe channel, is only 75 yards wide, with a depth of 29 feet in it; the other is nearly 200 yards wide, but so crooked and intricate that no good marks can be given for its safe navigation.

To enter Willoughby bay by the northeast or Horseshoe channel, run down about 1 mile distant from the reef until Cochrane's mill, on the low land at the head of the bay, is in one with the low rocky point on the south side of Christian cove, bearing NW. $\frac{2}{3}$ W., which mark will lead through the narrow cut; on the point there is the ruin of a small fort, 40 feet above the level of the sea, but it is scarcely visible. When fort Shirley comes in line with the south point of the inner part of the bay SW. by W., the vessel will be within the reef, and may haul up gradually for the anchorage.

With the prevailing winds vessels cannot fetch out; and as no safe directions can be given for the other channel, the

anchorage in this bay is only free to steamers, and they will require the assistance of an experienced pilot. The bay is exposed to the full force of the sea, which makes it even dangerous to approach in strong winds.

Shirley heights is a remarkable bold, rocky promontory, rising almost perpendicularly from the sea to the height of 545 feet, 4 miles to the southwest of Hudson point. On the flat summit will be seen the barracks and other buildings formerly of the garrison; and at the western edge of the precipice, a little more elevated, the two signal-posts of fort Shirley, which overlooks the entrance to English harbor. Between Willoughby bay and the heights are two small inlets, Mamora bay and Indian creek, which afford safe anchorage to droghers; the entrance to the former is obstructed by a bar with 10 feet water on it; the mouth of the latter is about 200 yards wide, and has a shoal nearly in the centre, the sea on which generally breaks.

Shirley heights.

English harbor, being entirely occupied by the government as a naval arsenal, is only visited by vessels of war, and is perfectly sheltered from all winds and sea. Water may be obtained with facility by hauling the vessel to the wharf, where it is conveyed on board through pipes. The harbor is, however, very confined in space, and its turnings are so sharp that vessels of great length must warp in.

English harbor.

The entrance to the harbor, which is only 200 yards wide, lies at the foot of Shirley heights, the west end of the lofty promontory forming the southeast side of the entrance, and on the northwest side a long, low, narrow, rocky fortified ridge, on the southeast extreme of which is fort Barclay. The greatest depth in the narrows is 23 feet, but only on one exact line of direction, viz, the north end of the wall of the governor's house on Dow hill in one with the rocky point at the north end of the sandy beach in Freeman bay; both white-washed, but a very doubtful mark, from the hill being so greatly elevated above the point. In the centre of the channel there is a small patch of $21\frac{1}{2}$ feet, consequently the 23-foot channel is not more than 40 yards wide; and as no confidence can be placed in the baffling winds, which come under the heights, no stranger should attempt to follow these directions without the assistance of a pilot, who is always at hand.

Vessels of 17 feet draught may moor alongside the northern wharf of the dock-yard, with a bower anchor to the eastward; or, if wanting coal, alongside the eastern wharf, with an anchor to the southward, securing with her own hawsers or chains. There are 22 feet water close off this wharf. At times the tide ranges 3 feet, but it is very irregular.

There are no stores in the dock-yard except coal.

Supplies are scarce and dear.

A sailing vessel should not attempt to enter the harbor with the wind to the eastward of north, but should anchor outside and prepare to tow or warp in.

There are no hidden dangers, and for a steamer or sailing-vessel undertaking to enter without a pilot it is only necessary to keep in mid-channel. Long steamers will find it difficult to make the short turn round Barclay point, and it will be more convenient for them to anchor in Freeman bay, where moorings are laid down.

The wind generally moderates toward evening, and the land-breeze in the early morning will enable a sailing-vessel to leave the harbor without much difficulty.

Falmouth harbor.

Falmouth harbor, 1 mile westward of English harbor, affords excellent anchorage for a few vessels of large draught, there being 24 feet water in the centre; it is, however, never made use of, except by droghers. The harbor may be said to be divided into two parts; the northeastern or inner being separated from the western by a spit, which extends from Blake islet more than half-way across, where it terminates in a small patch, named Spit shoal, with a depth of only 13 feet on it. Between it and the foul ground off St. Ann's point, the channel leading into the inner part is less than 200 yards wide, and is still further narrowed, for large vessels, by patches of 17 to 19 feet. A sailing-vessel of large draught would, therefore, have to warp through against the prevailing wind.

The heads of the inner part of Falmouth and English harbors are only separated from each other by a narrow, low, sandy ridge, about 1 cable across.

The outer anchorage, at the entrance to the harbor, for large vessels, is confined to a square space of about 400 yards each way; the inner, about 1 fathom deeper, is lessened in extent by several coral patches that have from 2 to

3 fathoms water on them ; inside the patch, that is awash, it is generally shoal with foul ground.

Standing in for Falmouth harbor from the eastward, having passed Shirley heights, the entrance immediately shows itself, and a vessel may then steer boldly toward the centre of the opening, until the E. end of the fort on Blake islet comes in one with a remarkable house on the western slope of Monk hill, bearing N. $\frac{3}{4}$ W. This mark will lead through the entrance, and having passed the Bishop shoal, which always shows itself, haul up and anchor as most convenient, according to the vessel's draught.

Westward of Falmouth harbor is the loftiest part of Antigua, in many places the rugged irregular hills rising abruptly from the shore, particularly between that harbor and Old Road bluff. In the immediate vicinity of the harbor are two conspicuous elevations, which are frequently of great value to vessels navigating the N. side of the island. The first is Monk hill, on the north side of the harbor, readily distinguished by the fort and signal-staff which crowns its summit, the SE. side overlooking a rocky precipice 695 feet above the level of the sea.

The other, on the NW. side of the harbor, nearly $1\frac{1}{4}$ miles westward of Monk hill, is a much larger conical hill, thickly wooded, and rises to the height of 1,058 feet. When seen from the NE. and SW. its summit appears to terminate in a peak ; but from the NW. and N. and points opposite it forms two peaks, and is consequently sometimes named the Saddle hill. It is also called Falmouth peak, which seems a preferable name, as there is another hill called the Saddle.

In clear weather both Monk hill and Falmouth peak may be seen from Barbuda, 45 miles distant. The hills farther westward are higher, but with the exception of Baggy peak, slightly elevated above the adjoining hills, are not particularly remarkable.

Old Road bluff, $2\frac{3}{4}$ miles westward of Falmouth, is a remarkable bold rounded headland, 135 feet high, steep-to, and easily recognized from the E. or W., as it is then seen to stand out a short distance from under the high land within it. To the eastward, and nearly midway between it and Falmouth harbor, is Ding-a-Ding nook, a small bay in which droghers find temporary shelter. On the W. side of the

Old Road bluff.

bluff the shore turns suddenly to the northward for $\frac{1}{2}$ a mile, forming the E. side of Carlisle bay.

Carlisle bay or
Old Road.

At the head of this bay, sometimes called the Old Road, is a sandy beach, its western side terminating in a bold rocky point, on which there is an old fort. The village will be seen just to the northward of it.

There is anchorage about midway between the Old Road bluff and the fort, in 4 or 5 fathoms water, $\frac{1}{4}$ of a mile or more from the shore. A long ground-swell, however, generally sweeps in from the southward, causing a vessel to roll heavily, and landing is sometimes difficult, as the surf breaks a considerable distance from the shore.

Goat head.

One and a half miles westward of Old Road bluff, on a projecting rocky point, will be seen a small rounded eminence, called Goat head, 115 feet high, which is very remarkable, especially when seen from off the W. end of the island. Between it and Old Fort point, at the W. side of Carlisle bay, are three small sandy beaches skirted by a coral ledge, which, abreast of the westernmost of these beaches, extends off more than 200 yards.

From Goat hill to the SW. end of the island the shore is low and sandy, with swampy ground at the back, and it is skirted by a flat coral ledge, nearly dry, through which are one or two boat-channels leading to good landing.

This part of the coast is also bordered with an outer barrier reef, nearly dry in many places, and at the W. end there is frequently a small sandy cay, which is occasionally heaped up and washed away by the violent action of the rollers.

Cade reef.

This danger, named Cade reef, lies about $\frac{3}{4}$ of a mile from the shore, and runs nearly parallel to it. Its E. end lies S. distant $\frac{3}{4}$ of a mile from Goat hill, and extends thence to the westward 2 miles. Its southern or outer edge is completely wall-sided, and consequently very dangerous to approach during the night, as the lead will give no warning, and, being under high land, no estimated distance can be depended upon. In the day-time it may generally be seen, and will be avoided by keeping the governor's house on Dow hill just open of Old Road bluff.

Middle reef.

Within the barrier there is an inner danger, named Middle reef, lying nearly $\frac{1}{2}$ a mile from the shore, and running also parallel to it; between it and the land there is excellent

anchorage, off Cade bay, where there is a good watering-place. The eastern or Goat Head channel leading into it has not less than 25 feet water, and is easy of access, but too narrow to work out of; a vessel will, therefore, have to run out through the western passage, which is barred by a flat, rocky ledge, on which there is not more than 21 feet of water.

Vessels running for the anchorage in Cade bay, or with a view to take the inner route to St. Johns between the reefs and the shore, should haul close round Old Road bluff in toward Morris Old mill, passing Curtain bluff, which forms the eastern side of Morris bay, within $\frac{1}{4}$ of a mile. When abreast of the mill, if the weather be clear overheard, discolored water will be seen off the end of the reef and the edge of the ledge which runs off Goat head, and this will enable the mariner to direct his course in mid-channel, which is nearly $\frac{1}{4}$ of a mile wide.

No leading mark can be given, and the directions are therefore not sufficiently trustworthy to guide a stranger without the assistance of an experienced pilot.

The SW. end of Antigua terminates at Old Fort point, which is low and rocky; there are the ruins of a fort near the extremity, and the barrack will be seen a little within them. Close on the S. side of the point is Johnson islet, a rock 18 feet above the sea, covered with brush-wood; being, however, under the high land, these objects are not easily made out until on a NW. or SE. bearing.

The W. coast of Antigua, from Old Fort point, turns sharply to the northward for a distance of $2\frac{3}{4}$ miles to Reed point. In this space are three small sandy bays named Picartes, Frys, and Morris, which are separated from each other by remarkable bold bluff headlands of the same names, about 100 feet in height. The highest part of Antigua may be said to terminate at Morris bay; in the vicinity, however, there are several remarkable heights, which are of great value to vessels navigating the W. side of the island, and become very conspicuous after passing Old Fort point. Six of them are close together on the S. side of Five Island harbor.

The Saddle, 596 feet, and Flat Top, 500 feet high, are the most eastern, and are at once distinguished by their names.

Heights on the
west coast.

Leonards, Pearns, and Mosquito hills are conical, with peaked summits thickly wooded. The two former are nearly of the same elevation, the latter much lower. Mount Thomas or Round hill, 547 feet in height, rises on the N. side of Five Island harbor, and makes as a large, rounded, woody hill from all directions except the NNW., when it appears more peaked. Three-quarters of a mile to the westward of it there is a narrow table-ridge of moderate elevation, terminating near its E. end in a small peak, 463 feet in height, named Table hill, which may be seen at a long distance, and is a valuable landmark.

Reed point lies at the foot of a wooded hill of moderate height, separated from the shore by a narrow neck of low, swampy land, forming the S. side of Mosquito cove, which is nearly $\frac{1}{2}$ a mile deep E. and W., and $\frac{1}{4}$ of a mile wide from Reed point to the opposite shore under Mosquito hill. Pearns point, at the NW. extremity of the cove, is low and rocky.

All this part of the coast of Antigua is extremely dangerous to approach, as it is fronted by a coral ledge, the outward edge of which is 2 miles to the westward of Frys bay. The ledge is studded with rocky heads, having as little as 9 feet water on them; and $\frac{3}{4}$ of a mile off Frys bay there is one which is nearly awash.

There is, however, a good channel within the shoals for vessels of 14-feet draught, provided the trade-wind is not too far to the northward, and they have the aid of a pilot.

The Five islands.

The Five islands are readily distinguished when seen from the northward or southward; but from the westward, being backed by high land, they are not easily made out, except the largest, which is 50 feet above the sea. The innermost island is 200 yards from the shore, with a 7-foot channel between. There are, in fact, but four islets, for the NE. part of the highest, which is called the fifth, from its appearing disconnected at a certain distance, is attached to its western end by a low rocky ledge. The two outer islands lie about $\frac{1}{2}$ a mile to the westward of Pearns point, and are steep to on their N. and W. sides. They are all, with the exception of the largest, low, small, rugged, rocky, and scantily clothed with brush-wood. The channel, with 15 feet

of water, lies between the highest and the one eastward of it.

Give Johnson islet a berth of $\frac{1}{4}$ of a mile, and when Sandy island comes in one with the E. side of the highest of the Five islands bearing N. by W. $\frac{1}{4}$ W., haul up on this line until the Hawk's Bill rock is just open of Pelican point, which mark will lead through the Five Island channel. This passage, however, is only 200 yards wide; if, therefore, on approaching it, the wind should be found too scant to allow the vessel to make certain of laying through, she had better pass out to the SW. of the Five islands, giving them a berth of 300 yards.

Directions for
inner channel.

Having passed Johnson islet, good anchorage will be found along this shore in 3 fathoms water, about $\frac{1}{4}$ of a mile from the shore, and good landing on the N. side of Frys bluff.

Vessels passing the SW. end of Antigua, outside the shoals, from the eastward, should take care, as before directed, not to shut in the governor's house on Dow hill with Old Road bluff until they have passed to the westward of the leading mark for the bar; they may then haul gradually round to the NW., taking care to keep Morris Old mill open southward of Goat head E. $\frac{1}{4}$ N. until Hawk's bill is opened westward of Five islands N. by E. $\frac{3}{4}$ E., when they may haul up N.; approaching the Irish bank, Great Sister in one with Ferris point, NE. by N., or Sandy Island light, N. by E., clears it to the westward, and when Mosquito hill comes on with Flat-Top hill you are northward of it. The soundings in this track are irregular, varying suddenly from 7 to 12 fathoms; in the night do not come within the depth of from 10 to 12 fathoms.

Five Island harbor is a bight northeastward of the Five islands, $1\frac{1}{2}$ miles deep, and, although exposed to the rollers, is a secure anchorage, with the prevailing winds, for vessels of 16 feet draught. The SW. point of the entrance to the harbor is formed by a remarkable red cliff, about 30 feet high, at $\frac{1}{4}$ of a mile to the northeastward of Pearns point, separating two sandy beaches; and from thence across to Pelican point, which forms the N. point of the entrance, it is $\frac{3}{4}$ of a mile wide. In the inner part of the harbor is a remarkable small round islet, called Maiden island,

Five Island
harbor.

with precipitous rocky sides, crowned with small trees, the tops of which are 90 feet above the sea.

The anchorage in Five Island harbor is obstructed by Cook shoal, a small rocky head with 9 feet of water on it, which lies in the centre of the harbor, with Sandy island in one with Pelican point, and Maiden island E. by N. $\frac{1}{2}$ N.

It is also obstructed at its entrance by the Pelican shoal of 15 feet water, which lies with Drew hill in one with Maiden island, and the Shipstern islet just shut in with Ferris point. Pelican islet is small, rocky, 8 feet above the sea, lies 400 yards westward of Pelican point, and is foul on its E. and W. sides 200 yards off.

Vessels of 16 feet draught when approaching Five Island harbor from the southward will have to pass outside the shoals; if from the northward, within them. In the former case it will be better to beat in to the southward of the Pelican shoal, between it and the Five islands. A vessel may stand toward the latter without fear, as they are bold and steep-to, and toward the shoal no nearer than to bring Drew hill a little open to the southward of Maiden island bearing E. $\frac{1}{2}$ N. When Johnson islet is seen through the Five Island channel she will be to the eastward of the shoal, and the board may be prolonged to the northward. When within the points of the entrance she may stand within 300 yards of the shore, until the leading mark for the Cook shoal is nearly on. It will be better to pass to the northward of this shoal; therefore, in standing toward it tack when Drew hill comes on with Maiden island. When within the shoal proceed as far in as convenient, the lead being a sufficient guide.

Coming from the northward the wind will be free, and when past Ferris point keep the shore aboard to about 400 yards, and having rounded Pelican islet rocks, should the vessel not fetch in, act as above directed. In leaving the harbor, run out with Seaforth bluff just shut in with the S. side of Maiden island, which will lead to the northward of Cook and Pelican shoals and to the southward of Hurst shoals.

The coast from Pelican point trends NNE. $1\frac{1}{2}$ miles to Ferris point, a woody bluff of moderate elevation. Thence it trends to the NE., forming two deep sandy bays, named Gal-

ley and Goat hill, and terminating at Goat hill, which is 176 feet above the sea, and crowned with a small fort with two signal-posts, and when seen from the southwestward, open of Ferris point, appears well defined. Nearly 200 yards westward of Goat hill there is a small, flat-topped, rocky islet, slightly wooded, called the Shipstern, its W. side having somewhat that appearance, being a bold perpendicular cliff about 60 feet high, with several large masses of rock lying at its base.

Midway between Pelican and Ferris points, about 300 yards from the shore, is the Hawk's bill, a small, barren, black, rocky islet, 25 feet high, steep and bold to on its W. side, which may be passed at the distance of 200 yards. Its W. side, being composed of soft sandstone, has been cut into by the action of the sea, forming a perpendicular cliff to nearly the top of the rock, where it overhangs, projecting out almost horizontally some feet. Its rounded summit terminates in a small knob, and, when seen clear of the land from the NNE. or SSW., has the appearance of a hawk's bill. It cannot be mistaken, and will be found of much value in navigating this side of Antigua.

From Goat hill the shore turns to the ESE. for $2\frac{3}{4}$ miles, forming the S. side of the harbor and roadstead of St. Johns.

St. Johns harbor, at the head of which is situated the city of St. John, the capital of the island, is the chief commercial port in Antigua, from whence is finally shipped almost all the produce of the island, which is brought by droghers from the outports. The city lies on the side of a gentle acclivity, which at the upper part is about 80 feet above the sea and contains about 16,000 inhabitants. From the offing its locality is at once pointed out by the cathedral, a large, massive white structure, with two lofty towers, the vanes of which are 163 feet above the sea.

The only other remarkable object is a kirk, a much smaller square white building with a sloping roof and a small bell-turret at its W. end; it stands a little above the cathedral, and about $\frac{1}{4}$ of a mile to the southeastward of it. At the back of the city there is a small wooded ridge of table-land of moderate elevation, with a distinct peak at either end; that to the SE. is 355 feet high and called Drew hill; the other, at the NW. end, called Scot hill, is not quite

so high, and being more rounded is not so well defined. They are both, however, serviceable landmarks.

The harbor is secure against all winds except hurricanes, but confined, and not at all convenient; for vessels of only 12-foot draught cannot come within $\frac{3}{4}$ of a mile of the wharves, and those drawing over 14 feet are obliged to load in St. Johns road. It is also exposed to rollers, which frequently break over the jetties and inflict serious damage. The harbor is of irregular shape, nearly 2 miles in length from the bar to the head, and the inner part, between Weak point and the W. point of the cove to the northward, is $\frac{3}{4}$ of a mile wide. Here, however, it is divided by Rat islet, which is small, rugged, steep, and rocky; on its summit is a large building and lofty signal-staff, which are conspicuous objects; the wall surrounding the building is 137 feet above the sea. The islet is connected to the shore by a well-built causeway, with a carriage road to the foot of the hill.

The NW. point of the harbor terminates in a small rocky bluff 37 feet high, on which is fort James, and the breadth of the entrance across hence to the opposite shore is $\frac{1}{2}$ a mile. A little without the entrance a flat of sand runs along the whole front of the harbor, on which the greatest depth at low water is $15\frac{1}{2}$ feet, which is near the southern shore, and the channel is not 100 yards wide. A small *nun* buoy lies on the N. side of the channel.

The West India and Panama Telegraph Company have an office here, and their submarine cables connect this island with St. Kitts and with Guadeloupe.

St. Johns road.

St. Johns road lies immediately northward of the bar, and may be said to extend from Goat hill to the Great Sister, a space of 2 miles. The road is obstructed in the centre by the Warrington bank and the Middle ground.

The outer part of the Warrington bank bears SW. by W. $1\frac{1}{4}$ miles from the Great Sister, and N. $\frac{1}{2}$ W. 1 mile from Goat hill; it has one fathom water on its shoalest part, frequently breaks, and is extremely dangerous to approach. The bank is 800 yards in length N. and S., and nearly the same in breadth.

The Middle Ground is a circular bank, about 400 yards in diameter, with a depth of from 20 to 23 feet on it, lying be-

tween the Warrington and the shore. The mark for the cut between these banks is, Table Hill peak in one with fort Barrington on Goat hill S. by W. $\frac{3}{4}$ W.; but it should only be taken in a case of necessity. To the eastward of the Middle Ground there is a clear ship-channel 4 cables wide.

There is good anchorage both to the NE. and SE. of these banks; but the NE. is the best and most convenient, as boats will in general fetch in to the entrance of the harbor, and it is always used by vessels completing their cargoes outside.

The Great Sister is a small rocky islet lying about $\frac{3}{4}$ of a mile from the shore, and when seen from the NW. has the appearance of a wedge, with its thick end to the SW., which is 36 feet high, bold and steep to within a cable's length. A quarter of a mile ENE. of this islet are the Little Sisters a small cluster of rocks only 4 or 5 feet above the level of the sea.

Great Sister.

The approach to St. Johns harbor is also obstructed to the westward by a shallow bank from $\frac{1}{2}$ to $\frac{3}{4}$ of a mile in extent, on the eastern side of which is a small cay called Sandy island, covered with stunted trees, the tops of which are 13 feet above the sea. It lies about W. $\frac{1}{2}$ N. $2\frac{1}{4}$ miles from Goat hill, and N. by W. rather more than 3 miles from the Five islands. Weymouth reef, a dry ledge, extends WSW. 800 yards from it.

Sandy island.

A *fixed* white light, 56 feet above the sea, visible 13 miles, is exhibited on Sandy island, from a black open wooden structure with red lantern. The light bearing SSW. clears the Diamond bank, and N. by E. clears the Hurst and Irish shoals.

Light.

The approach to the harbor from the northward is still more dangerous, for the shoals extend in that direction 3 miles from the shore.

The outermost danger, $\frac{1}{2}$ a mile long E. and W. and 3 cables broad, is a coral ledge called Diamond bank, and although nearly even with the surface of the sea, seldom breaks; under favorable circumstances, however, the discolored water may be seen from aloft when near it. From the Great Sister it bears N. by W. $\frac{3}{4}$ W. nearly $2\frac{1}{2}$ miles, and from Boon point, which is well defined, NW. by W. $\frac{1}{2}$ W. nearly $3\frac{1}{2}$ miles. It lies also near the W. end of the

Diamond bank.

dangerous reef or ledge which extends hence to the eastward all along the N. shore of Antigua, at the distance of from 1 to 2 miles, from which it is separated by a passage $\frac{1}{2}$ a mile wide called the Diamond channel, where the depth is from $4\frac{1}{4}$ to 6 fathoms.

Bannister bank, lying nearly midway between the Diamond and the Great Sister, is nearly $\frac{1}{2}$ a mile long in an E. and W. direction, and $\frac{1}{4}$ of a mile broad, and has as little as 17 feet water on it. The mark for its S. end is Boon mill, in line with Hodge hill, bearing E. $\frac{3}{4}$ S.

From the above description it will be seen that there are three principal channels which may be used to enter the road and harbor of St. Johns, the NW., W., and SW. or Sandy Island channel. The West channel is, however, but seldom used, except by vessels leaving the harbor. Vessels bound in from windward, having made the E. side of Antigua, generally pass round the N. end and receive their pilot, who is always on the look-out, in the offing near Parham. The shore, however, should not be approached within at least 3 miles, as it is everywhere foul and exceedingly dangerous to strangers.

Diamond channel.

Hutchinson's old mill, on the S. side of St. Johns harbor, in line with Great Sister S. $\frac{1}{4}$ E. leads through in $4\frac{1}{2}$ fathoms water, and between the Bannister bank and the eastern reef in 4 fathoms. When Hodge hill comes on with Boon Old mill E. $\frac{3}{4}$ S., keep away to pass about 2 cables westward of Great Sister; thence haul in for the anchorage. For this channel local knowledge is requisite.

Northwest channel.

With the wind scant, and no pilot, it will be better to run westward of the Diamond bank, hauling to the southward when mount Thomas, a dark peak, is in line with fort Barrington S. $\frac{3}{4}$ E. This is a long mark, and the fort is not easily made out. Keep this course, S. $\frac{3}{4}$ E., till Hodge hill is in one with Boon Old mill E. $\frac{3}{4}$ S., when haul up for the anchorage.

Beating in, when standing toward Sandy island, keep Wood's mill northward of Dry Hill mill until within the cay. When standing toward the W. side of the Warrington keep the Five islands open westward of the Hawk's Bill rock. The rock in one with the outer island leads $\frac{1}{2}$ a cable from the bank. When between the Great Sister and the War-

ington, and standing toward the N. side of the latter, Scot hill should be kept open to the northward of the kirk until within both it and the Middle ground.

When standing to the northeastward toward Bannister bank Drew hill should be kept open to the westward of the Great Sister until the vessel is to the southward of the bank, or Hodge hill open S. of Boon Old mill. The latter mill cannot be mistaken, as it is the only one on this part of the shore, and is without vanes. Hodge hill is a conspicuous small round hill 154 feet high on the NE. point of the island. There is a remarkable tree or large bush on the summit, which is the lookout station of the pilots.

Having passed within the Middle ground, which will be known when mount Thomas comes open to the eastward of the Pillar rock, bearing westward of S. by W., a vessel may anchor in 7 fathoms water between it and the Great Sister, taking care that Scot hill is well open northward of the kirk.

The anchorage is exposed to westerly winds, which, however, seldom occur; when they do, and are at the same time accompanied by rollers, it becomes dangerous.

The holding-ground is excellent, being clay and mud. The weather gives timely warning before a shift of wind to the westward.

Vessels bound to St. Johns harbor from the southward will find the Sandy Island channel the most convenient to enter, if they are of too great a draught to take the inner passage. This channel must be approached with the utmost care and attention to the lead, in order to avoid the dangerous shoals on the W. side of Antigua.

Sandy island
channel.

Being about $2\frac{1}{2}$ miles westward of Old Fort point, and with Hawk's bill open W. of Five islands, a N. course may be steered, which leads a good $\frac{1}{2}$ mile outside the shoals. Do not bring Sandy island northward of N. by E. until Maiden island is in one with Pelican rock, when, being abreast Hurst shoals, she may haul into the channel, which is more than a mile wide.

Standing to the northward toward Sandy island take care not to open the N. flag-staff at fort James northward of Goat hill E. $\frac{1}{4}$ N., a very close mark, as it leads within $1\frac{1}{2}$ cables of the reef in 4 fathoms water, and approaching

Hurst shoals keep the Camel tree well open of Shipstern point till mount Thomas is in line with Hawk's bill, when you will be to the northward of them. The Camel tree stands on the slope of the northernmost of the Pope's Head hills, the summit of which forms a small saddle. Having passed to the eastward of Sandy island, there is no danger until the Warrington bank is approached, when the directions for the NW. channel must be followed. If intending to anchor off the bar or to enter the harbor, a vessel may do so by the W. channel.

West channel. The West channel into St. Johns harbor lies between Warrington bank and Goat hill, and is nearly $\frac{3}{4}$ of a mile wide. In beating up this channel it will be known when the vessel is near the Warrington by mount Thomas coming on with Goat hill, and in standing toward it and the Middle ground keep Drew hill open southward of fort James bluff. The shore side is bold and steep-to. There is anchorage off the bar in 6 fathoms, good holding-ground, with mount Thomas in line with Pillar rock and the cathedral touching the N. extreme of Rat island. The latter of these, bearing E. by S. $\frac{3}{4}$ S., serves well also as a leading mark through the channel.

As the wind blows almost always out of St. Johns harbor, it can only be entered under the guidance of a pilot. To leave it is easy. Having weighed, run out with the S. gable of the westernmost large store in the city (which has a red roof and a flag-staff near it on the jetty) in one with the centre of the cathedral E. by S., which leads southward of the buoy and over the bar in 15 feet, and when Yepton house comes open of Loblolly point SSE. haul to the NW., and, the water having deepened, a course may be shaped through the West channel or to the anchorage in the road. In the latter case, passing inside the Middle ground, keep mount Thomas well open eastward of Pillar rock to avoid that bank, and Table hill open westward of the rock to clear the shoal ground northward of the bar.

Vessels bound to the eastward will gain by taking the Diamond channel, but they should be able to lie through.

North coast.

The N. coast of Antigua from fort James, at the entrance to St. Johns harbor, trends NNE. $2\frac{1}{4}$ miles to Wetherell point, the W. side of which forms a remarkable perpendicular

ular dark cliff 100 feet high. The intervening space is low and swampy. A mile to the eastward of the point there is also a remarkable *white* cliff. The shore is here more elevated, and an irregular group of hills extends to the SE. for 2 miles. Mount Pleasant, 456 feet high, is the loftiest, and is distinguished by its flattened summit. On the SW. end of the range there is a hill, crowned with a clump of trees, called the Pope's head, 366 feet high.

From Boon point, the extreme northern end of the island, the shore turns abruptly to the eastward and forms a bight, which terminates about 2 miles distant at Hodge point. This part of the shore is low, rocky, and skirted by sunken shoals, and there is only one spot, nearly $\frac{3}{4}$ of a mile westward of Hodge point and named Port Royal bay, where boats can effect a landing with safety. The hill just within this point becomes a useful object in the navigation of this extremely dangerous neighborhood.

From Hodge point the coast takes a SE. direction for $2\frac{1}{2}$ miles to fort Byham, Judge Bay point being intermediate. On the former there is a flag-staff. The shore is low and foul. From the fort the shore becomes deeply indented, and forms two deep bights, the southern of which is Parham harbor.

Parham harbor is capable, of admitting vessels drawing 13 feet, but the channels to it are so exceedingly narrow and intricate, that the few vessels which load here receive their cargoes in the North sound or Roads. The town of Parham stands in the SE. corner of the bight, under a wooded hill 165 feet high, on the W. side of which is the church, a conspicuous object from the offing. Parham was at one period the seat of government, and is still of some importance, being the place of transit for the greater part of the commerce of this end of Antigua.

The eastern side of the harbor is protected by a long, irregular, low, swampy neck of land, about $\frac{3}{4}$ of a mile in length, which terminates at North Sound point in a small hill 60 feet high. From the E. side of the neck numerous small islets, rocks, and reefs sweep all round to the NW., inclosing a large basin of water, completely sheltered, called the North sound.

Great Bird island.

Great Bird island is the most remarkable of the islets which enclose North sound, and a valuable object to the pilots. It lies on the outer edge of the reef, $1\frac{1}{2}$ miles ENE. of North Sound point, and is of irregular form, its W. side very low, but its E. side is a narrow strip of black barren rock 600 yards long in a N. and S. direction, rising perpendicularly from the sea to the height of 110 feet, and may be seen from a long distance, the N. end particularly, as it forms a bold headland. The NE. point of the dangerous reef and coral ledge, which extends from hence all along the N. side of Antigua as far as the Diamond bank, bears from the bluff N. by W. $1\frac{1}{2}$ miles.

Three-Fathoms bank.

Three-Fathoms bank lies NE. a mile from Bird Island reef, which always breaks, and nearly 2 miles N. by E. of Great Bird island. It is about $\frac{3}{4}$ of a mile in length NNW. and SSE., and 600 yards in breadth, with a depth of from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms on it, over coral and white sand, with irregular soundings around.

Four-Fathoms bank.

Four-Fathoms bank lies NE. $1\frac{1}{4}$ miles from Three-Fathoms bank, and NNE. 3 miles from Great Bird island. It is composed of small detached rocky heads, lying nearly on a straight line NW. and SE. for $\frac{3}{4}$ of a mile, having a depth of $4\frac{1}{2}$ and $4\frac{3}{4}$ fathoms, and on which there is generally a heavy sea. In beating up to the eastward, do not attempt to pass to the southward of these banks before the hill at the E. end of Green island bears S. $\frac{1}{2}$ E.

Bird Island channel.

The entrance to Bird Island channel, which leads into North sound, lies a mile to the northward of Great Bird island, and the few vessels which visit the sound enter this way; but it is so exceedingly dangerous to approach, narrow and intricate, though deep enough for any ship, that no safe directions can be given, and it can only be navigated by the most expert and experienced pilots. As the wind blows continually in, the passage out of the sound must be taken through a narrow channel between Maid and Long islands, in which there is a depth of 14 feet, but it requires to be buoyed beforehand.

Long island.

Long island protects the N. side of North sound and the E. side of Parham sound. It is very irregular in shape, nearly a mile in length E. and W., and $\frac{3}{4}$ of a mile in breadth at its W. end, decreasing toward the E., where it terminates

in a point. The shores are low, but on its SW. end there are some trees 40 feet high. Two hundred yards northward of the NW. point is Moor islet, small, rocky, and 8 feet high; and at $\frac{1}{2}$ a mile eastward of Long island is Little Bird island, of similar character, but only 20 feet high; both are useful objects in navigating the channels through the reefs.

Parham sound is about $\frac{3}{4}$ of a mile in extent E. and W., and $\frac{1}{2}$ a mile N. and S. It is capable of receiving a few vessels of large draught, is well sheltered, has good holding-ground and not exposed to the action of rollers. The Yam Piece shoals, which are composed of detached coral patches, extend nearly a mile from the west end of Long island, and shelter the anchorage from the NE.

Parham sound.

Parham sound may be approached from several points between NE. and NW. through narrow openings in the Kettle Bottom shoals. The leading marks for them are given on the chart, but they are far too dangerous for a stranger to navigate, and it is only a well-experienced pilot that can attempt to make use of them. The largest and most generally used is the Horse channel, nearly 600 yards wide, between the Harney and the Horseshoe shoals; it has, however, the disadvantage of being to leeward of the anchorage, for if the trade-wind should be to the southward of E., a vessel will not fetch clear of the Prickly Pear, a small rocky islet, partially wooded, about 15 feet high, NE. by N. 800 yards from Hodge point.

The leading mark through Horse channel is Thibou's mill just in sight, to the eastward of Hodge hill, bearing S. $\frac{3}{4}$ W., which leads close to the westward of Horseshoe shoal. In approaching it, either from the eastward or westward, a good offing must be kept; in the former case do not bring Great Bird island to bear to the eastward of SE. before the leading mark comes on. As the vessel draws in upon the mark, the N. end of Great Bird will be seen coming on with Little Bird island, which line leads over the S. side of the Horseshoe shoal. Before it comes on, the discolored water will be seen from aloft, which will enable a vessel to pass close to the shoal by the eye, and, being prepared, to luff close up round it.

In standing toward Prickly Pear islet, do not open Moor islet to the northward of the highest part of Great Bird island; and on the opposite tack to the NE. take care to shut Little Bird in with Great Bird island, or to bring fort Byham flag-staff in one with a small table-hill of moderate height, with a peak at its E. end, a little southward of Parham, and bearing S. by E. $\frac{1}{2}$ E. from the fort. This latter mark leads westward of the Ward and Scott shoals, and also through a very narrow cut to windward of the Horse-shoe, but it is difficult to be made out. Vessels drawing 17 feet should not anchor farther in to the southward than to bring Martin's and Blizzard's mills in one. The former stands on the shore a little to the southward of High point, the latter on the upper ridge of hills above it.

Vessels leaving Parham sound for St. John will find it to their advantage to pass within the shoals through Boon channel, which is quite straight and clear, and nearly $\frac{3}{4}$ of a mile broad in its narrowest part, except at its E. end, where, between the NW. point of Prickly Pear ledge and Silver Rock shoal, it is little more than $\frac{1}{4}$ of a mile across. Run out of the sound, with fort Byham a little open to the eastward of the peaked hill before described, until Moor island comes in one with the highest part of Great Bird island SE. by E. $\frac{1}{2}$ E. Steer upon this line until Thibou's mill is in one with Hodge hill, thence a W. $\frac{3}{4}$ S. course will lead to abreast the Great Sister, and the directions given for the Diamond channel must then be followed, taking care not to haul to the southward before fort James comes open to the westward of the Sister.

Guana and Belfast bays.

Between Guana island, which shelters Parham North sound, and Indian Town point, at $2\frac{3}{4}$ miles ESE. from Byham point, the E. end of that island, the shore becomes exceedingly irregular, and forms two deep bights, Guana bay to the N., and Belfast bay to the S. Both are well sheltered by the islets and numerous reefs to the eastward, and of sufficient depth for vessels of large draught; but the channels are far too intricate for them to navigate, particularly as the prevailing winds, which are here accompanied by a heavy short sea, make even a near approach to this part of Antigua very hazardous. They are frequented by droghers, which are sometimes exposed to accidents and long delays,

as they cannot beat out, except under favorable circumstances. There is a boat communication between the bays and North sound, through the narrows at the W. end of Guana island.

Between Indian Town point and Man-of-War point, at the E. end of Antigua, the shore again forms a deep bight to the westward called Nonsuch bay, which is so completely protected by reefs nearly dry as to be a secure harbor, with a depth of from 5 to 8 fathoms; but it is equally difficult to navigate as those just described, and quite closed against sailing-vessels of large draught.

Nonsuch bay.

There is a rise and fall of tide at the island of Antigua, sometimes amounting to 2 feet, but generally less, and so uncertain in its periods as to be of little use to navigation. No regular tidal stream can be detected.

Tides.

The current is equally variable in its movements, and the oldest pilots can give no certain accounts of either its strength or direction. During the period of the survey of these islands, between November and May, little or no current was met with between Antigua and Barbuda, although this is the period when the trade-wind blows strongest. In June it has been found running strong to the westward, on the S. side of Antigua, when at the same time there was little or none on the N. side, and an eddy stream close inshore.

GUADELOUPE.*

The island of Guadeloupe (called by the Caribs Karukera) was discovered by Columbus during his second voyage in 1493, and was named by him from the real or fancied resemblance of its mountains to those of Santa Maria de Guadeloupe, in Spain. It was colonized by the French in 1635, and with but slight interruption has remained ever since in their possession.

The island is separated by the river Salée into two parts, the western, or Guadeloupe proper, called Basse-Terre, and the eastern, called Grand Terre. The whole territory is

* The description of this island is taken almost entirely from the work of M. Edmond Ploix, of the French navy, who surveyed this and the neighboring islands in 1867-'68-'69.

under a governor appointed by the French government, and with the dependencies of Marie-Galante, the Saintes Petite Terre and Desirade, had, in 1871, a population of 149,525 inhabitants.*

Although only separated by a shallow arm of the sea, about 4 miles long and 100 yards wide, the eastern and western portions of the island differ very materially in appearance and in their geological character.

The western portion is of volcanic origin; the soil is clayey, and the surface rugged and uneven. A chain of lofty wooded mountains traverse this part of the island from NNW. to SSE. The most northern peak of this chain is called Sainte-Rose; the most southern, Trou-au-Chien. Near the southern end the Soufrière, an active volcano, rises to a height of 4,870 feet, and near the middle are two conical peaks called the Mamelles.†

On the western side of the mountains the declivities are steep, with rapid torrents rushing down to the sea; but on the eastern slope the descent is more gradual.

There are among the mountains numerous mineral springs of various descriptions.

Basse-Terre is 25 miles long, north and south, with a width of 15 miles.

Grande Terre, the eastern division of the island, is almost a level plain, having a limestone formation, with two ranges of small hills—one on the northern shore, 300 feet high, called the heights of Bertrand, and another farther south, and running nearly parallel with the southern shore, called the hills of Ste. Anne. These hills are about 375 feet high, and are separated by deep gorges, having at the bottom sluggish and sometimes stagnant streams, which gradually filter into the sea through the sand-bars at their mouths.

The shape of this part of the island is nearly triangular. The northeast side, from North point to Chateaux point, measures 23 miles; from Chateaux point to Pitre point, 23 miles; the west side, from Pitre point to Antigue point, 12 miles; and from Antigue point, along the north shore to North point, about 5 miles.

* The north part of the island of St. Martin is also under the control of the governor of Guadeloupe.

† The last eruption of the Soufrière took place in 1799.

The principal productions of the island are sugar and manioc, but all kinds of tropical fruits and vegetables are raised, and large quantities of sugar, coffee, cocoa, rum, molasses, annatto, cotton, dye-woods, &c., are exported. The importations consist principally of rice, salt fish, wines, machinery, hardware, cotton, silk, and worsted goods.

Guadeloupe has mail communication with the other West India islands and with Europe and America, at least four times a month; while almost daily communication takes place between the different towns of the island and its dependencies.

Mails.

By means of the telegraph-cable landed at Basse-Terre and joined to numerous land lines, the ports of the island are in constant communication with the United States and Europe.

Telegraph.

Except during the rainy season, the climate of Guadeloupe varies very slightly as regards either barometric pressure, temperature, or winds. The barometer rises regularly every day till about half-past nine a. m., then falling till half-past four p. m. rises again till ten o'clock in the evening, when it again falls till half-past four in the morning, oscillating during each twenty-four hours between 29ⁱⁿ.99 and 30ⁱⁿ.07. The mean daily height also varies during the year, being lowest in October, increasing till March or April, then remaining nearly stationary till July, when the maximum height is attained, after which the mean daily pressure gradually decreases during the rainy season. The abnormal variations of the barometer are almost always accompanied by hurricanes, which take place during the rainy season, between July and November. When observed at other times of the year they indicate atmospheric disturbances taking place at a distance too great to be otherwise felt in this island.

The mean temperature of Guadeloupe is about 79° Fahrenheit throughout the island except at Basse Terre, where it is 80°. Its minimum is reached between January and March, ranging from 70° early in the morning to 84° at noon, while during the rainy season the least temperature is about 77°, rising in the middle of the day to 88°; sometimes, but very rarely, attaining a height of 95°.

The average amount of moisture in the air of Guadeloupe is very great. If complete saturation to the point of precipitation be considered as unity, the usual amount of moisture may be represented as from 0.64 to 0.73. Heavy rains are most frequent from the middle of July to the middle of October, being then attended by violent thunder-squalls.

Showers fall occasionally at all times of the year, but are less frequent on the weather side of the island than to leeward.

At Point-à-Pitre the annual rain-fall is nearly ~~4.0~~ ^{40.} inches; at Basse Terre, nearly ~~6.0~~ ^{60.} inches.

Winds.

The winds blow almost constantly from the eastward. The following table, showing the direction of the wind during one year, has been derived from the observations during three years:

	Direction of the wind.									
	North.	NNE.	NE.	ENE.	East.	ESE.	SE.	SSE.	South.	Calm.
Number of days during the year....	8½	5½	68½	40	136½	26½	40½	3	2½	30½
										Light westerly airs.
										5

During the months of December, January, February, and March the wind has the most northing, somewhat heavy but short squalls from N. and NE., attended with copious showers, being not infrequent about the end of the year.

In February the wind blows freshly from the E. during the day, with fine weather, the breeze decreasing every evening and rising again about 8 or 9 o'clock in the morning.

In May the winds become comparatively regular between ESE. and SE., continuing till November, when they gradually draw round to the northward. The commencement of the rainy season, about the end of May or beginning of June, is marked by thick weather, with a heavy swell along the coasts. Generally, however, with the exception of squalls and occasional hurricanes, calms and light variable winds prevail during the rainy season. Calms also occur some-

times during March and April. The summit of the Soufrière mountain is generally visible shortly after sunrise for a quarter or a half an hour, when it becomes hidden. If during the day it is again uncovered it is an indication of calms and fine weather.

When the breeze is fresh on the weather side of the island it also blows strongly to leeward, but when it is light to windward it is very apt to be calm on the lee side of the island, or else a light westerly wind is experienced, modifying very agreeably the excessive heat frequently felt.

The tides on the coasts of Guadeloupe are not strong, the rise and fall averaging about 12 inches, but ranging from 8 inches to 2 feet. The tides seem to be produced by two waves—one semi-diurnal and the other diurnal, the latter only having about $\frac{2}{3}$ the value of the former, so that of two successive tides at full moon, one is higher than the other, (the highest tide being in the evening,) but at neap-tides they are equal. Tides.

At Basse-Terre rollers are experienced during the rainy season, while at port Moule they are only felt toward the end of the year.

Earthquakes are frequent at Guadeloupe; the most violent on record was in February, 1843, when the town of Pointe-à-Pitre was destroyed.

The eastern extreme of Guadeloupe is a bluff, rocky point, about 144 feet high, and of quite remarkable appearance, called Chateaux point, and having off its northern side two sharp-peaked, rocky islets. The point is clear of danger, and may be passed close to. Chateaux point.

Port St. François, $5\frac{1}{2}$ miles to the westward of Chateaux point, is only a reef-harbor, about 200 yards in diameter and with a depth of 13 feet. With a SE. wind a heavy sea sets in here.* Port St. François.

There are two sugar-factories in the neighborhood, but no stores can be procured, and vessels must be entered and cleared at the custom-house of Point-à-Pitre.

The position of the harbor may be known by the houses of the town, partly in ruins.

* See H. O. Chart No. 531, Anchorages in Guadeloupe.

The mark for entering the channel is to bring a conspicuous tree to bear N. $\frac{1}{2}$ W. in line with the eastern corner of a house behind it. This course carries 14 feet of water through the channel between the reef and cay Rouge, a shoal with 9 feet of water on it.

A red buoy marks the eastern side of the channel, and should be passed at a distance of about 40 yards.

During the season of NE. winds vessels may anchor to the southward of port St. François, $\frac{1}{2}$ a mile off shore, in 6 fathoms of water, with a bottom of sand and broken shells.

Sainte - Anne
anchorage.

Seven miles farther to the westward is the anchorage of Ste. Anne, fit for vessels drawing not more than 13 feet.* The harbor, though small, is well sheltered and not difficult to enter. The best channel, called the Grande pass, is only 80 feet wide, and is on the eastern side of the reefs which protect the mouth of the harbor. At the western end of the village the gaol will be perceived, having a square tower in the middle surmounted by a pointed roof, and inland a little way are the gray ruins of the Plaisance mill, which must not be confounded with another ruined mill close to the beach. To enter Grande pass the eastern angle of the gaol bearing NW. $\frac{1}{4}$ N. must be kept in line with Plaisance tower. This line will carry at least 5 fathoms, passing close to a warping-buoy moored just outside the reef. On getting inside the reef, haul up NW. by W. $\frac{1}{4}$ W., and anchor with the gaol bearing NNW. and the Diamond rock just open of the western point of the bay.

To enter or go out through the Petite pass on the W. side of the middle reef, keep the tower of the gaol bearing N. by E. on with the SW. corner of a wooden shed in front of the gaol, on the beach. This line carries 9 feet, and passes W. of the wreck on the 2-fathom patch near the centre of the harbor, and E. of the Beef-Barrel shoal.

Westward from Ste. Anne anchorage, at a distance of 2 miles, and lying about $\frac{1}{2}$ a mile off shore, are two remarkable islets, called the Diamond rocks. A short distance inshore of these rocks is Sand island, having a few bushes on the northern end. Between these islands and the main-land is Petit-Havre anchorage, with a depth of $3\frac{1}{2}$ to 5 fathoms.

Petit - Havre
anchorage.

* See H. O. Chart No. 530, Anchorages in Guadeloupe.

oms, with the Diamond rock bearing S., and the rocky bluff called Petit-Havre point, on the E. side of the bay, E. by N. Between the Diamond and Ste. Anne there is a 17-foot bank lying $\frac{2}{3}$ of a mile off shore. It can be avoided by keeping off shore so as not to open the Diamond clear of the land.

The bay of Pointe-à-Pitre or Petit Cul-de-sac, formed by the coasts of Grande Terre and Basse Terre, is about 5 miles wide between its limits, Gozier island on the NE. and the Goyave river on the SW., and is about 4 miles deep.*

An outer barrier of reefs and shoals extends in a NE. direction from the mouth of the river Goyave, with depths of over 100 fathoms just outside. Within this outer line of shoals, and separated from them by an outer road or anchorage, are numerous other reefs and islets.

In approaching the entrance to Pointe-à-Pitre all these shoals may be avoided by keeping the Saintes islands open of the island of Guadeloupe.

About 4 miles NNW. of the Diamond rocks is the island of Gozier, low and sandy, and about a quarter of a mile in diameter. The island lies about $\frac{1}{2}$ a mile off shore, abreast of the village of the same name, from which it is separated by a channel having from 10 to 16 feet of water, and fringed by a coral reef.

Gozier island is a pilot-station, not only for Point-à-Pitre, but for all the ports and anchorages on the E. and S. sides of the island.

From Gozier island is shown a *fixed white* light, elevated 56 feet above the sea-level, and visible 8 miles between the bearings of NW. $\frac{1}{4}$ N. round by S. to NE. $\frac{1}{4}$ N.

About $1\frac{1}{2}$ miles to the westward of Gozier island is Grande bay, a slight indentation in the land, just outside of the entrance to Pointe-à-Pitre. The western limit of the bay is a bold headland, on which is a fortification called Fleur d'Épée. There is good temporary anchorage here in $4\frac{1}{2}$ fathoms, with the fort NE. by N. and Gozier light-house E. by S. $\frac{1}{2}$ S. Vessels loading in any of the neighboring sugar-ports anchor here while effecting their clearance at the custom-house of Pointe-à-Pitre.

* See H. O. Chart No. 364, Point-à-Pitre and Approaches.

Mouchoir-Carré shoal. On the western side of the channel leading to Pointe-à-Pitre, and a little more than 2 miles WSW. from Gozier island, is the Mouchoir-Carré shoal. It is of small extent, with about 12 feet of water on it and generally breaks.

Cay Plate. W. of Mouchoir-Carré, about $\frac{1}{2}$ a mile, is cay Plate, a coral patch with 19 feet of water.

Mouton Vert shoal. About 1 mile SSW. of Mouchoir-Carré is the Mouton Vert shoal, extending $\frac{1}{2}$ a mile WNW. and ESE., and on which the shoalest spot has 13 feet of water. There is always a heavy swell over this bank, although the sea does not usually break.

Dupont cay. Three-quarters of a mile to the southward of Mouton Vert is Dupont cay, a coral reef $\frac{1}{2}$ a mile in extent and generally awash. Between this reef and Mouton Vert is a channel with 24 fathoms of water, but having, half-way between the two shoals, a coral head, with 20 feet of water on it.

Half a mile to the southward of Dupont cay is the northern edge of Martinique cay, on which the sea generally breaks. Its southern edge joins Goyave point at the mouth of the river of the same name.

The channels between these islands and reefs and those within them are navigated constantly by coasters bound to and from the ports of Petit-Bourg, Goyave, and Sainte-Marie.

Frégate islands. Inside this outer line of shoals are numerous islets, generally difficult to distinguish from the land behind them. Two of the most conspicuous are Frégate de haut and Frégate de bas.

They lie about 1 mile NW. of Mouchoir-Carré, are low and wooded, and are connected by a coral reef.

Bacchus point. Bacchus point, one of the most important landmarks in approaching Pointe-à-Pitre, lies on the western side of the bay, about 2 miles WNW. of the Frégate islands. It is a triangular bluff, surmounted by two hillocks, and is marked by horizontal shelves all along the face of the bluff.

Cochon island. In the northern part of the bay and forming the western side of the channel leading to Pointe-à-Pitre is Cochon island, easily distinguished by the fort and flag-staff on its eastern end. It is low and wooded, steep to on the southern side,

and on the eastern side having a coral reef awash at low water and running off 300 yards.

The harbor of Pointe-à-Pitre, near the entrance to the river Salée, is approached through a somewhat crooked channel about 150 yards wide, but having 5 fathoms of water. It is formed by Cochon island and the neighboring islands on the W., and by the cays and reefs extending from the shore on the E.

Pointe-à-Pitre.

The channel is marked by four buoys on the E. and one on the W. side. The reefs and shoals in the harbor are marked by beacons.

The outer buoy marking the edge of the reef off cay d'Argent is black and flat; the next, about 300 yards to the northward, is a white can-buoy; the next, about 300 yards to the N. and W. on the edge of the reef off Rat islet, is also a white can-buoy, and the inner buoy, off Manroux islet, is black and flat. All these buoys must be left close aboard on the starboard hand in entering.

Buoys.

On the W. side, marking the edge of the shoal-water off Cochon island, is a cylindrical buoy just inside the 4-fathom line.

About $\frac{1}{2}$ a mile to the northward of the outer buoy and on the E. side of the channel is a wooded islet called Manroux island, from which a *white fixed* light is shown at an elevation of 52 feet above the sea and visible 7 miles.

Light.

A *red* and *green* light is shown from the outer buoy and a *white* light from the buoy on the W. side of the channel. A *red* light is shown from each of the other buoys on the E. side of the channel.

The steamship company (Compagnie Générale Transatlantique) cause on the 6th, 10th, 20th, and 27th of the month, when their vessels are expected, a *white* light to be placed on the beacon opposite Fouillole point, and a *green* one on their mooring buoy.

The beacons on the W. side of the harbor mark shoals of small extent having passages between them.

A spit extends westward from off the northern wharf, having at its extreme a bank of 6 feet, marked by a buoy on its S. side.

The town of Pointe-à-Pitre, on the NE. side of the harbor, is one of the most important commercial places in the Wind-

ward islands. It is a clean, well-kept, thriving place of 14,000 inhabitants. It was settled in 1763, and was in 1843 destroyed by an earthquake. In 1871 two-thirds of the town was laid in ruins by a terrible conflagration, but the traces are rapidly disappearing.

The harbor is perfectly secure, even in hurricanes.

On the eastern side of the harbor is an extensive sugar-factory called the Usine d'Arbousier, the numerous chimneys of which form excellent landmarks for approaching the port.

The only fresh water to be purchased at Pointe-à-Pitre is rain-water from cisterns. This is furnished at 10 francs a ton when it is at all to be obtained.*

Merchant-vessels frequently get water from a brook called Bon Gout, emptying into the west side of the Salée river, about 3 miles from the anchorage.

Coal, provisions, and general ship's stores can be procured here.

Vessels lie alongside the wharves in 13 feet of water.

Harbor dues.

The port dues are as follows:

1. Temporary anchorage, less than 72 hours, 11 francs. After this time full port dues must be paid.

	Francs.
2. Pilotage for vessels of 80 to 100 tons.....	78. 75
101 to 150 tons.....	118. 12
151 to 200 tons.....	144. 37
201 to 250 tons.....	170. 62
250 to 300 tons.....	196. 87
301 to 350 tons.....	223. 12
351 to 400 tons and over.	249. 37

3. Light-house dues, a ton..... .40

4. Buoys and beacons dues, a ton..... .40

5. Visit of health-officer, if inside the harbor.... 10

Visit of health-officer, if outside the harbor... 15

Interpreters for foreign vessels receive the same.

Tonnage-dues.—For improvement of the harbor a tax of 2 francs a ton is imposed on loaded vessels, and 50 centimes a ton on those in ballast.

Tides.

It is high water at full and change at Point-à-Pitre at 10^h. The mean rise and fall of the tides is 16 inches. This is, however, much affected by the wind.

* The franc equals about 19 $\frac{3}{4}$ cents; 100 centimes equal 1 franc.

Vessels approaching Guadeloupe from windward should endeavor to make the island of Desirade, keeping on the parallel of $16^{\circ} 20'$. On making this island, which can be seen at a distance of 30 miles, the course lies between Chateaux point and Petite Terre, and then along the coast of Grande Terre, keeping at least 1 mile off shore on account of the 17 feet bank. When abreast of Gozier island, haul to the northward to take a pilot if intending to go inside.

With a vessel drawing 20 feet or more, and being to the SW. of Gozier island, bring Jarry mill, a prominent tower on the west side of the harbor, to bear NW. It will then be just open to the eastward of the east point of Cochon island, and open to the southward of the only outer buoy; this line will lead up to the outer anchorage or to the entrance buoy.

Vessels coming from the W. and S. will usually have to tack before they can fetch the entrance. In approaching the entrance of Pointe-à-Pitre, they should not stand so far to the westward as to shut in the Saintes islands with Capesterre point.

On nearing the entrance by keeping to windward of a line drawn from the Usine d'Arbousier through Maunoux Island light-house, S. by E., the outer shoals will be avoided.

If Desirade island should be made during the night, the navigator should keep in sight the light on Petite Terre, visible 15 miles in clear weather, and guided by it there will be no difficulty in coasting along the S. side of Grande-Terre, keeping in from 11 to 14 fathoms of water until Gozier Island light is made. Care should be taken to keep clear of the coral reefs on the W. side of the bay by keeping this light bearing to the northward of NE. till daylight. Although the buoys are lighted, strangers should not attempt to enter at night.

Vessels generally go to sea with the land-breeze at early daylight, usually taking a tow-boat at the cost of 10 cents a ton.

Bound to Europe or the United States they generally pass to leeward of Guadeloupe. Some navigators prefer to go to windward of Grande-Terre, beating through the channel

N. of Marie-Galante and passing between Chateaux point and the island of Desirade.

Petit-Bourg. The village of Petit-Bourg lies 1 mile S. of Bacchus point, on the W. coast of the bay of Pointe-à-Pitre.

Its anchorage is frequented by small vessels and may be reached after passing within the line of outer shoals, by passing close to the southward of Frégate de Bas island and of Hache island, $\frac{1}{2}$ a mile farther W., and keeping on the same course $\frac{1}{2}$ a mile farther, when good anchorage in 20 feet will be found 300 yards off shore.

Goyave. Goyave anchorage lies $3\frac{1}{2}$ miles to the southward of Petit-Bourg. Local knowledge is necessary to take a ship in and out.

Sainte Marie. This anchorage, lying $1\frac{1}{2}$ miles S. of the river Goyave, is an important port of export for sugar. Its locality is easily distinguished by three red bluffs just N. of the town.

It is an excellent anchorage for vessels not drawing over 15 feet, but the approaches are intricate, and the assistance of a pilot is necessary.

Capesterre. The district of Capesterre, lying S. of Ste. Marie, was formerly the richest and most highly cultivated part of Guadeloupe. Rising high above it is Madelaine mountain, with numerous torrents rushing down its abrupt slopes.

Off Capesterre point the soundings are very irregular, and a berth of 1 mile at least should be given to the coast, which from here to Vieux Fort point, 12 miles, trends in a S.W. and SW. direction.

Vieux Fort point. Vieux Fort point, the southern extreme of the island, is steep-to and clear of danger. Some of the black ferruginous rocks of which it is formed are magnetic.

Basse-Terre. The town and anchorage of Basse-Terre lie $2\frac{1}{2}$ miles N. of Vieux Fort point. The anchorage is a perfectly open roadstead, with very deep water at a short distance from shore. With the wind from S. or W. the anchorage is very unsafe, and vessels should at once go to sea, but during the season of strong trades, although a somewhat heavy swell almost always sets in, the anchorage is safe. Even during this season heavy rollers sometimes cut off all communication with the shore for a time.

Vessels approaching the anchorage from the southward should haul close round the S. point of the island, keeping

always prepared for the violent puffs of wind which rush down from the mountain, and, keeping the shore close aboard, should haul up for the anchorage inside the mooring buoy of the steamers, and anchor off the town as most convenient, in from 16 to 22 fathoms, 300 to 400 yards from the shore.

The town of Basse-Terre is the seat of government of the island, and has a population of about 6,800 people, not including the garrison. There is frequent mail communication with the other islands, and the West India and Panama Telegraph Company have an office here.

Water can be easily obtained from a pipe emptying near the centre of the town. Water.

On a flag-staff at the landing-place a lantern is hoisted, showing a *white* light to the westward, but *red* to the northward and southward. It is 43 feet above the sea-level, and can be seen at a distance of 9 miles. A fainter red light is shown at a less elevation from the end of the wharf. Light.

From Basse-Terre the western coast trends in a NNW. direction for about 20 miles. Along this coast is found anchorage for small vessels in numerous coves and small bays generally, with a village of the same name on the shore of the bay. Western coast.

Anse à la Barque,* $6\frac{1}{2}$ miles north of Basse-Terre, is the best sheltered of these anchorages, although very small. Anse à la Barque.

Anse de Bouillante is 3 miles farther N., and is so called from some hot springs in the vicinity. Visitors must not step off from the beaten paths, as there are many hidden holes filled with boiling water.

Off Anse de Pigeon are two islets of the same name, with several rocks awash between the islets and the main-land.

Still farther N. are the bays of Caillou Ferry and Deshayes.

Deshayes bay may be recognized by the remarkable isolated hill of the same name, 682 feet high, with a black, jagged, pyramidal rock off its NW. side.

On the western coast of Guadeloupe there is a land-breeze almost every night, extending about 2 miles off shore, and exceedingly useful to vessels bound either N. or S. Winds and currents.

*Anse is a name given in the French islands to a small bay or cove.

Outside of this limit light variable breezes and calms lasting several days are sometimes experienced, so that vessels which do not approach the land close enough to benefit from the land-breeze would do well to keep 20 or 25 miles off shore to avoid these calms.

A strong SE. current, depending on the strength of the NE. trade-wind, is frequently felt off the west coast of Guadeloupe. Tides are very little felt.

North coast.

On the northern coast of Guadeloupe and Grande-Terre the land forms a deep bay called Grand Cul-de-sac Marin. To the eastward it is limited by Gris-Gris point, with the islands abreast of it, and its western limit is point Allègre, also with off-lying islets.

Kahouanne islet.

About $1\frac{1}{2}$ miles northward from the NW. end of Guadeloupe is Kahouanne islet, 243 feet high, and nearly covered with wood. It is steep to and clear of danger except on the NE. side, where a reef with less than 10 feet of water extends to a distance of 800 yards.

From Kahouanne islet a bank with numerous islets and reefs upon it stretches off to the eastward at a distance of from 1 to 3 miles off shore and extending nearly to the coast of Grande-Terre.

The sea inside of it is of course nearly always smooth, but the passages between the numerous reefs and shoals can only be navigated with the aid of a pilot. The islets and cays on the outer reef are used as landmarks for coasters beating along the N. shore and also for entering the channels leading to the various harbors in the bay.

The pilots who are familiar with the intricate channels of Cul-de-sac Marin are almost all fishermen, and, like those of the Bahama bank, endeavor in navigating these channels to have the sun behind them, and are guided to a great degree by the color of the water in avoiding dangerous shoals.

Tête à l'Anglais, an islet 150 feet high and shaped like a liberty cap, lies 1 mile NE. $\frac{1}{2}$ N. from Kahouanne islet. Between these two islands is a channel in which the least water is 18 feet, but the soundings are irregular.

Passes through the reef.

There are several passes through the outside reef, of which the principal are Grande-Coulée, between Tête à l'Anglais, and a sandy cay called Blanc islet, with a depth of $8\frac{1}{2}$ fathoms; Passe à Caret, just W. of the cay of the

same name, with a depth of 5 fathoms; Passe-à-Fajou, with 15 feet, and Passe-à-Colas, the easternmost of all.

Rose bay, about E. $4\frac{1}{2}$ miles from Anglais isle, is sheltered on the N. by a reef, through which are two small openings, with a depth of 15 to 22 feet; the western opening leads to the small bay of Ramée; the Grande-Coulée channel lies N. of it. On this part of the shore a long, low, narrow, level plain lies at the foot of the great mountain-range.

Anchorage in
Cul-de-sac Marin.

Nègre point, the extremity of a narrow ridge of land, separates Mahaut bay from that to the W., named Cercelle, and W. of the latter is the bay of Lamentin, with the town of the same name. These bays are obstructed by sand-banks, and only navigable for very small vessels.

A small river of the same name runs into the sea at the head of the bay, and Grand river, the principal stream of Guadeloupe, which rises in the central mountains, empties itself near the N. point of the bay.

Mahaut bay is about 6 miles eastward of Rose bay, on the N. side of the narrow tongue of land which separates Grande-Terre from Capesterre. There is excellent anchorage in the outer part in 7 or 8 fathoms water, and farther in, off the town, in from $3\frac{1}{4}$ to $4\frac{1}{2}$ fathoms. The best pass to enter is the Caret, about 4 miles NNW. of the bay, and Fajou isle on the E. side of this opening bears N. from it.

To the eastward of Mahaut bay, and SE. of the little islet of Christophe, is the N. entrance to Salée river, which separates Capesterre from Grande-Terre.

Petit Canal bay, on the W. side of Grande-Terre, extends from Macou point, which lies 4 miles northward of the entrance to the river Salée, to Gris-Gris point, 3 miles to the northward of it; it is, however, only an anchorage for droghers, who find their way, by the eye, through the reefs fronting it to the westward.

Port Louis is an open roadstead, 2 miles to the southward of Antiques point, the NW. extremity of Grande-Terre. The anchorage is tolerably well sheltered from June to October, although a NNW. swell is felt; at other times, however, it is quite exposed.

Port Louis.

Port Louis is easily recognized by the high chimney of the *usine*, or sugar-factory, 1 mile E. of the town.

The population in 1875 was 4,927. Provisions are scarce and dear, and rain-water only can be obtained. Vessels come here to load sugar, but must enter and clear at the custom-house at Point-à-Pitre.

The best anchorage will be found directly abreast of the town in 8 fathoms of water, about $\frac{1}{4}$ of a mile off shore.

This part of the coast is foul to the distance of nearly $\frac{1}{4}$ of a mile, and the bank of soundings only extends about $\frac{2}{3}$ of a mile off shore. Five feet of water will be found at the end of the wharf.

From Antigues point to Grande-Vigie, or North point, and thence to the bay of Sainte-Marguerite the shore of Grande-Terre is steep-to and clear of danger. From Vigie point to Sainte-Marguerite it is formed by rocky bluffs about 200 feet high, with caves at the bottom. Grande-Vigie point is quite remarkable, being formed by a sharp rocky point, something like a ship's cutwater, and surmounted by a flat table-land.

Sainte-Marguerite bay is entirely unsheltered and only frequented by fishing-boats. To the southward of this bay the coast is foul and fringed with coral reefs for $\frac{1}{4}$ of a mile off shore, as far as Chateaux point, and the shore is low and sandy.

Port Moule.

Port Moule,* lying half-way between North and Chateaux points, is a very small harbor, but is tolerably well sheltered. The coral bank which extends along the coast protects the port and is here about $\frac{1}{3}$ of a mile wide, with two narrow openings. The harbor can only be entered with the aid of a pilot, who is ready to board ships on their appearance if the bar is passable.

Vessels are moored head and stern in about 4 fathoms of water to anchors on the reefs, but as they lie across the swell it is a very uneasy berth. When rollers set in the moorings are sometimes carried away and the vessels lost on the reefs. The current of the river which empties into the harbor is sometimes strong enough to set vessels ashore.

La Moule is quite an important place, there being nearly 10,000 inhabitants and five large sugar-factories. There is daily mail communication with Point-à-Pitre.

* See Hydrographic Office Chart No. 380, Port du Moule.

Vessels discharge coal here and load sugar. Provisions and water of good quality are difficult to obtain.

The position of the town is easily distinguished by the high chimney of the Duchassaing factory, SW. of the town, by flags hoisted on the approach of vessels, and by the battery on the western point of the bay.

The following signals are shown from the flag-staff when vessels are seen approaching :

A *red flag* signifies that the bar is not passable and the vessel should haul off.

A *white flag with a red square* signifies that the pilot will lead the way in ahead of the ship.

A *white flag with red diagonal* signifies that the vessel can enter the harbor.

A *fixed white* light, 46 feet above the sea-level, is shown from a tower W. of the anchorage and N. of the town. It can be seen from 5 to 7 miles. There are two passes through the coral reef which shelters the port. The northern opening, called Grande pass, lies between the Barrel of Beef on the E. and Mouton de Haut on the W., the latter reef being dry at low water. Light.

There are 18 feet of water on the bar of this channel. To enter, Sergeant mill, $\frac{1}{2}$ a mile inland, must be kept on with the corner of the N. wing of the custom-house (the easternmost building of the town) bearing SSE. until Couronne rock opens out clear of the land behind it.

This course leads about 400 yards E. of St. Jean cay and along the edge of Mouton de Bas reef.

Hastings channel, between Barrel of Beef and Mouton de Bas reefs, has from 5 to 7 fathoms of water, but is very narrow and crooked.

In fine weather a vessel may anchor outside the reef in 9 fathoms, sandy bottom, and good holding-ground, with the light about S. $\frac{1}{2}$ E.

From Port du Moule to Chateaux point there is no good anchorage. About $4\frac{1}{2}$ miles NW. of point Chateaux is Gourde islet, which is rather remarkable, and lies just outside of the reef, which is steep-to. Gourde islet.

DESIRADE.

The island of Desirade was the first land made by Columbus on his second voyage, and was so named by him. It lies 4 miles eastward of Guadeloupe, of which it is a dependence, is 6 miles long ENE. and WSW., from 1 mile to $1\frac{1}{4}$ wide, and about 900 feet high.

The population is about 1,600. The climate is very dry, very little rain falling. Cotton is cultivated, but most of the inhabitants are fishermen.

Water is only to be obtained from a deep ravine on the NE. side of the island.

Galet anchor-
age.

There is tolerably good anchorage in Galet bay on the SW. side of the island, in 5 fathoms of water, with a remarkable house on with a tamarind tree just above it bearing E. by N. $\frac{3}{4}$ N., and the two rocks of point Colibris in line S. by E. $\frac{1}{2}$ E.*

Grande-Anse.

Grande-Anse, the principal town of Desirade, lies on the SE. side of the island, $4\frac{1}{2}$ miles to leeward of the eastern end. Small vessels can pass through a cut in the reef and find sheltered anchorage inside, and in fine weather larger vessels may anchor outside in 5 fathoms of water with the church bearing north; but the soundings are irregular.

Anse de Ma-
haut.

Mahaut bay, near the eastern end of the island, is a similar small reef-harbor for coasters. The government has established here a leper hospital.

The NW. shore of the island is steep-to, but the SE. side from Colibris point beyond Mahaut bay is fringed with coral reefs extending $\frac{1}{4}$ of a mile off shore. The eastern point of the island should be given a good berth on account of the Mouton rock, lying 3 cables off it, and generally breaking.

The channel between Desirade and Chateaux point is frequently used by vessels bound to the northward. The Desirade shore should be kept aboard.

Currents.

After strong easterly winds there is a westerly current of 2 knots and upward off Colibris point.

PETITE TERRE.

Petite Terre is the name given to two low, sandy islets separated by a narrow cut, and lying about 5 miles SE.

* See Hydrographic Office Chart No. 531, Galet anchorage.

from Chateaux point. The northeastern islet is called Terre de Haut; the southwestern one, Terre de Bas. They are mostly covered with vegetation, and have a narrow sand-beach along the water's edge. The inhabitants are mostly fishermen.

As all the shores are foul and rocky to the distance of from $\frac{1}{4}$ to $\frac{1}{2}$ a mile, the island should not be approached in passing nearer than 2 miles, at which distance there is a depth of from 13 to 20 fathoms of water.

About 200 yards from the eastern point of Petite Terre island is a light-house tower, 95 feet high, from which a *fixed white* light is shown at a height above the sea-level of 118 feet, visible in clear weather 15 miles.

Sans Nom, or Banc des Vaisseaux, is a bank of coral and sand, lying $6\frac{1}{2}$ miles southward of the village of Sainte-François, and having as little as 6 fathoms of water on it. It is about $\frac{1}{2}$ a mile long N. and S. and $\frac{1}{3}$ of a mile wide, and, when the sun is shining, can be easily distinguished by the color of the water.

Bank.

MARIE-GALANTE.

The island of Marie-Galante is a dependency of Guadeloupe, and is situated in the channel between Dominica and Guadeloupe, 15 miles S. of the eastern extremity of the latter island and 18 miles NNE. of Dominica. The island is of an oval shape, with an area of about 60 square miles, and a population in 1871 of 14,367.

The general appearance of the island is flat and low, the soil in many places marshy, and the climate unhealthy.

The weather-side of the island is not generally cultivated; on the lee side are several sugar plantations.

The western side of the island is generally steep to and clear of danger, so that vessels may anchor almost anywhere within 1 mile of the land. Inside of this distance the soundings gradually decrease from 8 fathoms toward the shore, but outside of this line the depths increase rapidly.

The southern and eastern shores are dangerous, being skirted by a reef to the distance of from 2 to 3 miles.

Grand-Bourg, at the SW. extremity of the island, is the principal town, and has a population of about 6,500. The

Grand-Bourg.

town was nearly destroyed by a hurricane in 1865, but has been rebuilt.

The harbor is formed by low cays, only uncovered at low water, and is very small, with a depth of from 10 to 15 feet. The channel between the cays leading to it has 16 feet of water and is 600 feet wide.

Large vessels anchor outside the reef in about 8 fathoms of water, with the church-tower in line with the end of the breakers bearing NE. The bank of soundings is quite narrow, and $\frac{3}{4}$ of a mile outside of the reef there are 28 fathoms of water.

Light.

A *fixed white* light is shown from the angle of the fort. It is 46 feet above the sea-level, and can be seen 7 miles in clear weather.

St. Louis bay.

St. Louis bay, between Cimetière point, the NW. extremity of the island, and Folle point, is the best anchorage for large vessels. The holding-ground is good and there is anchorage $\frac{1}{2}$ a mile off the village in 4 fathoms of water. The bay is full of excellent fish, and by hauling a seine large quantities may be easily taken.

American whalers make this a place of resort.

Vieux fort.

Vieux fort, near the N. point of the island, is a small village of little importance. Abreast of it is a small islet of the same name, with a 15-foot channel between the islet and the main-land.

Anchorage in 5 fathoms of water will be found $\frac{1}{2}$ a mile off shore, with this islet bearing NE. at the same distance.

A shoal, with from 3 to 5 fathoms of water, extends $\frac{1}{2}$ a mile northward of this islet, with a 5-fathom patch lying $\frac{3}{4}$ of a mile from the islet N. by W.

Northward of Cimetière point, about $\frac{3}{4}$ of a mile, there are also 3 and 4 fathom patches.

Capesterre.

Capesterre, at the SE. end of the island, has a small reef-harbor, where coasters load the sugar brought from the plantations of the E. and NE. parts of the island.

THE SAINTES.

The Saintes, so called from their having been discovered on All Saint's day, form a group of islands attached to the government of Guadeloupe, and lie in the channel between Guadeloupe and Dominica, 15 miles from the latter, and 6 miles SE. of the former island, from both of which they are

separated by clear and deep channels. Terre de Haut, or St. Peter, the largest and easternmost of the group, is separated from Terre de Bas, the westernmost, by a channel nearly $\frac{1}{2}$ a mile wide, navigable for vessels of any size. There is but little vegetation on the island. The inhabitants, numbering in 1873 1,430, are skilful fishermen and boatmen. The climate of these islands is exceedingly healthy; fevers are said never to occur. Water is scarce, people generally depending on rain-water, and the fall of rain being less than in the neighboring island. Fresh provisions can generally be obtained.

St. Peter island is about $2\frac{1}{2}$ miles long NE. and SW., and is of a very irregular shape, varying in width from $\frac{1}{4}$ to $\frac{3}{4}$ of a mile. Mount Chameau, at the SW. end, has a tower on it, the summit of which is 1,037 feet above the sea. On one of the northern hills is fort Napoleon, used as a military prison, and the NW. end of the island ends in a steep promontory called the Sugar-loaf. St. Peter island.

The town and principal anchorage are on the west side of the island, in a bay abreast of Cabrit islet.

The shore of St. Peter is generally clear of danger; there is, however, a short cable's length NE. by N. from point Portail, (at the foot of the hill surmounted by fort Napoleon,) a rock with 12 feet of water on it, which breaks when the sea is at all rough. All round Terre de Haut are small bays and coves, in most of which landing is practicable.

There is temporary anchorage in 10 fathoms of water, south of St. Peter island, between Boisjoli point and Redonde islet, off the southern point of the island; but the best anchorage is off the town, a good harbor, with a depth of from 9 to 14 fathoms, and well sheltered to the westward by Cabrit island. Anchorage.

For vessels not wishing to enter this harbor, good anchorage may be found between the Sugar-loaf and the SW. side of Cabrit islet, in 11 fathoms of water, with a bottom of sand and coral.

Cabrit or St. George islet, 600 yards west of St. Peter, is 260 feet high, and serves as a quarantine station. There is also a penitentiary on it. Vessels in quarantine anchor here, abreast of the cove, with the south point of the islet bearing about ESE., in 11 fathoms of water, with a bottom of sand and shells. Cabrit islet.

The northern channel, between St. Peter and Cabrit islands, called Whale channel, is 600 yards wide, with a depth of from 10 to 18 fathoms. It is divided toward its northern entrance into three channels by the Whale shoal and the Whale rock. The Whale shoal is steep-to, and has only 2 feet of water on it. It lies 700 yards W. by S. of Portail point, the northwest end of the island, nearly 600 yards NE. by E. $\frac{1}{2}$ E. of the northeast end of Cabrit island, and NW. by N. 350 yards from the Whale rock. With any sea this reef breaks, and in a calm it may easily be seen from aloft.

The Whale rock is steep-to, and is $3\frac{1}{2}$ feet out of water at high tide. Between it and the Whale shoal there are 7 fathoms of water, and $4\frac{1}{2}$ fathoms between the Whale rock and St. Peter island.

Less than a cable NE. of Portail point there is a patch with 12 feet of water on it called the Caille shoal. By giving the point a berth of $\frac{1}{4}$ of a mile the shoal will be cleared. In approaching the anchorage off the village of Bourg des Saintes from the northward, the channel W. of the Whale shoal will be found the widest and best; but with the wind to the southward of E., the eastern channel may be preferable. To enter by the western channel keep the church in the village open of point Mire till the Whale shoal is passed. A good anchorage will be found in $7\frac{1}{2}$ fathoms abreast of the village with the Whale rock in line with Mire point. To enter to the eastward of Whale shoal bring Boisjoli point, the southwestern extremity of St. Peter island, just visible between the Sugar-loaf on St. Peter island and Sandy point on Cabrit island. Steer in on this line till Whale rock is passed and haul up for the anchorage. As Whale rock is steep-to and visible light-draught vessels may pass on either side of it.

Sugar-loaf passage lies between the southern point of Cabrit island and Red head, both of which points are steep-to and clear of danger; but the channel is obstructed by a coral shoal 100 yards in diameter, on which there are only 8 feet of water. It lies nearest the northern shore of the channel, about $\frac{1}{3}$ of the distance between Cabrit island and Red Head bluff. The water does not generally break on this shoal, but the discolored water indicates its position.

Sugar-loaf channel is convenient for leaving Bourg anchorage. To pass out to the southward of the shoal, bring the church in Bourg village to bear E. and steer W. till Sandy point on Cabrit island, when a course may be shaped clear of danger. To pass to the northward of the shoal, stand to the NW. till the S. side of Pâté islet is on with Pâté point. This mark will lead 100 yards to the northward of the shoal.

St. Paul's island, or Terre de Bas, is nearly square, with sides about $1\frac{1}{2}$ miles long. The sides are not deeply indented, and are free of danger outside of a cable's length from shore. The summit of the island is somewhat rounded and is 930 feet high. St. Paul's is-
land.

Anchorage may be found on the W. side of the island, and on the E. side are two small coves.

The Pâté rock lies $\frac{1}{4}$ of a mile to the northward of St. Paul's island. It is clear of danger on the eastern side, but on the western side a reef extends off 400 yards, and is terminated by a shoal of 15 feet. This reef narrows the passage between St. Paul's island and Pâté rock to the width of 200 yards, but by keeping well over to St. Paul's a vessel may run through in case of need with not less than 6 fathoms of water. Pâté islet.

St. John's or Grand islet, 4 cables southward of Redonde islet, is the largest and highest of the islets S. of St. Peter's and St. Paul's. It is $\frac{3}{4}$ of a mile long E. and W., about 600 yards wide, and 551 feet high. St. John's islet.

Off the W. end of St. John's islet are rocky islets called the Sow, or Coche, and the Augustins, but the channels between, though deep in places, are foul and only fit for boats. Sow or Coche
islet.

The SW. channel, between St. Paul and St. Augustin islands, carries from 11 to 17 fathoms, and is clear of danger, with the exception of a reef which extends about 400 yards off the W. end of St. Augustin islet. The southern extreme of Cabrit islet in line with Boisjoli point, bearing NE. $\frac{1}{4}$ N., leads through in mid-channel. Southwest chan-
nel.

Great Cay channel, between St. John's islet and Redonde, is clear of danger, but a berth should be given to the 10-foot patch W. of Redonde. Great Cay
channel.

AVES ISLET.

Aves islet.

Nearly abreast of the channel between Guadeloupe and Dominica, and lying 117 miles W. $\frac{3}{4}$ S. from the SW. point of Guadeloupe, is Aves or Bird islet; so called from the multitudes of sea-birds of various kinds which frequent it.

The island is $\frac{3}{4}$ of a mile long N. and S., $\frac{1}{4}$ of a mile wide, and about 10 feet above the level of the sea. It is of coral formation, and is skirted by a reef on the NW., N., and S. sides, extending $1\frac{1}{2}$ cables off. On the W. side there is anchorage and a landing-place.

The islet appears to rise from a bank of soundings of considerable extent, which has not been minutely examined, but which seems to be irregular in depth.

Fishermen from St. Eustatius and other neighboring islands visit the island in March and April to gather sea-bird's eggs, which are taken to St. Thomas and sold in large quantities. No fresh water is to be found. Landing is sometimes impracticable on account of rollers.

The rise and fall of tide is about 3 feet, the flood generally setting to the NW.

The islet may be seen at a distance of 8 miles during the day, but at night not farther than 2 miles.

Anchorage will be found with the middle of the islet bearing NE., with a bottom of sand and rock. Care should be taken to anchor on a sandy spot, which may be easily picked out by the eye.

On the above bearing the water gradually shoals from 12 fathoms at the distance of 1 mile to $2\frac{1}{2}$ fathoms $\frac{1}{4}$ of a mile from the beach, but the water is rather deeper near the S. end of the islet.

From observations by Lieut. Lawrence, R. N., the centre of the island lies in $15^{\circ} 42'$ N. lat., $63^{\circ} 38'$ W. lon., depending on fort Christian, St. Thomas being in $64^{\circ} 55' 53''$ W.

DOMINICA.

The island of Dominica was discovered by Columbus, on Sunday, November 3, 1493, and was named by him. It has been in possession of Great Britain since 1783. The island is somewhat oblong in shape, 27 miles in length NNW. and SSE.; its extreme breadth is 13 miles, its extreme northern end being a little over 2 miles, and the southern portion 6 miles in breadth, and it contains an area of about 290 square

miles. It is of volcanic origin, with lofty rugged mountains running through the centre of the island from N. to S., the highest of which, Diablotin, 9 miles from the northern point, is 4,747 feet above the sea, and most conspicuous. Trois Pitons and mount Miestrin, respectively 4,672 and 3,891 feet in height, lying in a northwesterly direction about 5 miles from the town of Roseau, are the second principal features of the mountain-range which continues irregularly to the southern point, varying in heights between 2,000 and 4,000 feet. Mount Soufrière, near the southern end of the island, has several openings, around which sulphur in large quantities can be obtained. In the Roseau valley there are several boiling springs, the principal one being 4 miles from the sea, and near the Wotten Waven estate.

About 6 miles NE. of Roseau, and more than half-way across the island, on the top of a high mountain and surrounded by others more lofty, is a lake of fresh water covering several acres. The valleys are fertile and watered by numerous streams, which abound with excellent fish. The dry season (February and March) only lasts for about six weeks; in the remaining part of the year much rain falls. The highest mountains are only seen on an average twice a month. The greatest rain-fall is in August and September, and during these months hurricanes and thunder-storms are frequent and violent. The minimum temperature is 75°, maximum 90°; the latter is experienced for fully three months in the year. The annual rain-fall at Roseau is about 80 inches; in other parts of the island it is even more. The southern part of the island is healthy, mild fevers alone prevailing, as in other healthy parts of the West Indies. Prince Rupert bay and the northeastern part are considered unhealthy.

The principal articles of export are rum, sugar, molasses, coffee, &c. The population in 1871 was 27,585.

There are several good roadsteads on the western side of the island, the principal of which is Roseau, where is situated Charlotte-town, the capital of the island.

Vessels sailing under the lee of Dominica should be on their guard against the heavy squalls which come off the high land and through the deep valleys, blowing with great force during the strong trades. Off Soufrière bay and the

Layou valley are the two most dangerous places. When the trades are light, calms are frequent.

Le Cachacrou or Scott head, the southwest point of Dominica, a small promontory 234 feet high, and connected to the island by a narrow neck, is a conspicuous object, and when seen from the north or south, clear of the land, appears as an island. West one-sixth of a mile from the north part of the head is a rock with 7 feet on it at low water. Scott head should not be approached to within a distance of $\frac{1}{2}$ a mile.

Soufrière bay is north of Scott head, and $1\frac{1}{2}$ miles wide. This cannot be recommended as an anchorage, as it is so very steep-to, small droghers having to make fast to the shore as well as anchor.

Point Michelle is N. $\frac{1}{2}$ W. $2\frac{3}{4}$ miles from Scott head. On the point is a well-built Roman Catholic church, with a large conspicuous cross south of it. Off this point, with the church S. of E. and $1\frac{1}{2}$ cables off shore, a vessel may anchor in from 5 to 8 fathoms. Care must be taken to let go the anchor smartly, as the water deepens so suddenly that drifting a few hundred feet will change the depth from 10 to 20 or 30 fathoms.

Roseau.

The town of Roseau stands on one of the few sloping points found on the coast of Dominica, and is 5 miles distant from Scott head, and immediately south of the Roseau river. The table land of mount Bruce, which is 475 feet high and dotted over with old military buildings, overlooks the town. Fort Young and the conspicuous square-built court-house are slightly higher than the other buildings in the south part of Roseau. The spire of the Roman Catholic cathedral is the most conspicuous object, and is distinctly seen when approaching from the north or south. The telegraph-cables connecting the island with Guadeloupe and Martinique are landed in Woodbridge bay, a short distance north of Roseau river.

Anchorage.

The best anchorage off Roseau is with the court-house, a building to the southwest of fort Young, bearing between N. and ENE., in from 6 to 8 fathoms water, 200 yards off shore. The precaution of letting go the anchor smartly must be strictly observed, as the distance between the depths of 9 and 30 fathoms is only about 150 yards. The anchorage off the town cannot be recommended, as it is very steep, and there is scarcely room for a small vessel to swing toward the beach.

It is high water, full and change, approximately, at Roseau at 1^h 30^m. Springs rise 1 foot 6 inches. To leeward of the island no dependence can be placed on the turn of the tide. For several days the set may be north or south with the direction of the coast, the strength in some places being two knots an hour; and within a distance of 10 miles, the set may be quite in opposite directions. On the windward side the flood and ebb are regular; off Point à Peine the flood runs with a velocity of 1.5 miles per hour. Off the northeast part of the island the flood attains a velocity of 2 miles per hour; but the ebb, only $\frac{1}{2}$ a mile an hour, is hardly perceptible. Tides.

A *red* light is shown from fort Young when the mail-steamer is expected. Light.

The market at Roseau is generally well supplied. Beef can be obtained at 6*d.* per pound, pork at the same price, and mutton at 9*d.* per pound. The island vegetables, of great variety, are excellent and cheap, and fruit is plentiful. Supplies.

Woodbridge bay is 1 $\frac{1}{4}$ miles wide, and lies between Roseau on the S. and the high land of mount Daniel on the N. A conspicuous row of palms, running in an easterly direction and leading up from the Goodwill estate, which is in the southern part of the bay, is an excellent guide. The tablelands at the back of the bay, intersected by ravines, are much lower than mounts Bruce and Daniel. Off the N. point of the bay rocks extend for a cable, and, on a coast so steep and free from dangers, show out conspicuously. Good anchorage can be obtained in from 8 to 12 fathoms 300 yards from the beach, with the Goodwill chimney just open to the southward of the conspicuous row of palms, bearing E. by S. $\frac{1}{2}$ S., and Scott head touching the shingly point of Roseau river.

Water may be obtained from a river in Woodbridge bay, but, the beach being rough and stony, it is attended with much inconvenience.

The coast from mount Daniel runs in a NNW. direction, with slightly indented bays. Layou river, the largest in the island, is just 6 miles from the shingly point of Roseau river; when seen from the westward the entrance may be easily Layou river.

distinguished by the lowness of the land. The source of the river lies near the foot of the Couronne hill, which is comparatively low when seen with Diablotin to the N. and Trois Pitons to the S. Good anchorage for droghers can be obtained N. or S. of the entrance to the river, 400 yards from the shore, the depths being 8 and 10 fathoms. The northern anchorage is most frequented by small craft shipping wood or sugar. In a SW. by S. direction from the entrance of the river, the water is very deep, and at anchoring distance off shore there are 40 fathoms. Wood in large quantities is shipped from this river.

Grand Savanna is the largest sloping piece of land on the western side of the island. From Scott head it is distant 15 miles, and is 12 miles southward of cape Melvil or Capuchin. This sloping piece of land is generally extremely parched in appearance, with little or no cultivation.

Anchorage.

The western point of Grand Savanna brought to bear ENE., distant about 600 yards, and in from 10 to 20 fathoms, rock and sand, is the best anchorage ground. Closer in shore there are several patches of mushroom rocks, which a vessel's cable is likely to foul and be difficult to recover. From Grand Savanna the land extends in the same NNW. direction for nearly 4 miles. The coast is steeper and more rugged than immediately to the southward, the rugged cliffs terminating the long and regular slopes which fall from mount Diablotin being of considerable height.

A small river immediately N. of the Grand Savanna is favorable for watering, and wood can be obtained at from 10s. to 12s. per cord.

Barber's block, a conspicuous hill 1,234 feet in height, lies 5 miles to the northward of Grand Savanna. When seen from the N. or S. it is, as its name denotes, like a barber's block, the facial part being the summit and shoulders of the hill. From a westerly view it makes like a sharp cone.

Prince Rupert
bluff.

Prince Rupert bluff, the northern head of Prince Rupert bay, is a steep bluff surmounted by two remarkable hills, known as the East and West Cabris, 473 and 623 feet high, respectively. To vessels coming from northward or southward they appear as islands, but they are joined to the shore by a neck of low swampy ground. This prominent peninsula forms the N. side of Prince Rupert bay.

Prince Rupert bay, 3 miles wide and 1 mile deep, lying ^{Prince Rupert bay.} between Prince Rupert bluff and point Ronde, is the best anchorage in Dominica. In the NE. part of the bay, and facing the beach, is the small and dilapidated town of Portsmouth. The Roman Catholic church, with its tall spire, stands a few hundred feet from the shore. The Methodist chapel, a white building, is $\frac{1}{3}$ of a mile inland, and on the foot of a long low spur. Morne au Diable, 2,917 feet in height, stands to the NE. of the bay, the spurs from its summit meeting those from mount Diablotin at the back of the bay in a neck about 600 feet high.

The most convenient anchorage is in about 8 fathoms, sandy bottom, with the Roman Catholic church bearing NE. $\frac{1}{2}$ E. and the extreme of Prince Rupert bluff NW. by W. North or S. of this position the anchorage is good, but not so convenient for obtaining wood and water.

Prince Rupert bay is the best and most convenient place for obtaining wood and water. Wood is brought alongside at from 10 to 12 shillings per cord. The Indian river, which is S. of the Roman Catholic church, is a good place to water from. A market is held in the town on Saturday, and is generally well supplied.

If bound to this bay from the eastward, it will be better to pass to windward of the island and round its N. end, to avoid the risk of being becalmed under the high lands.

Douglas bay is directly N. of Prince Rupert bluff. Small vessels visit this place for fire-wood. Anchorage may be found in from 5 to 8 fathoms, sandy bottom, $1\frac{1}{2}$ cables off shore. From the N. point of Douglas bay to cape Melvil, the NW. point of Dominica, the coast is cliffy and steep-to.

Point Jaquet is the eastern point of the northern extreme of Dominica, and from this point the land runs nearly in a straight line W. $\frac{1}{4}$ S. for 2 miles to cape Melvil; the coast between these points is a bold and lofty cliff, about 1,000 feet above the sea near the centre, decreasing in height toward its extremes.

La Soye point is 1 mile to the westward of Crumpton point. A small anchorage of 4 fathoms is formed by the point and reef stretching to the NW., but is very confined, scarcely allowing a small schooner room to swing at her anchors; vessels are steadied by hawsers made fast to the

shore. A pier is built inside the point, and the landing is easy. The bays to the westward of Crumpton point afford good landing for about 4 miles, when again the coast to point Jaquet assumes a rugged character.

Crumpton point is the northeastern point of the island. The coast to the westward for 6 miles is low, with alternate cliffs and sandy bays.

The character of Dominica in the NE. quarter presents a distinct contrast when compared with any other portion. The land rises from the sea less abruptly, the soundings off the coast showing a continuation of this gradual slope, 100 fathoms being found $3\frac{1}{2}$ miles off shore. Mounts Concorde and Grand Bois, in the NE. quarter, are respectively 2,106 and 3,034 feet in height, the latter being 3 miles from the coast.

Captain Scott rock, the only danger off the windward side of the island, is under water, and lies $2\frac{1}{2}$ cables from the first point N. of Pagoua bay. There are 16 and 18 fathoms on the eastern side of the rock, the sea breaking heavily over it in strong trades.

Pagoua bay lies to the northward of Pagoua point; the northern shore of this bay, known as N. end, trends round to the N. and W. to Petit Marigot, one of the few landing-places on the windward side of the island.

St. David bay.

St. David bay, to the northward of Grand Marigot bay, lies midway between the N. and S. points of Dominica; on its S. side is a small rocky islet, which, with an adjacent promontory, affords shelter for droghers. With a northerly wind a heavy sea sets in, making it difficult for vessels to put to sea. The anchorage is only safe with the wind S. of ENE. In the valley is the well-cultivated estate Castle Bruce; all its produce is shipped in droghers, which anchor under the rocky islet. A large pier is being built near the centre of the bay. A conspicuous range 2,400 feet high rises over St. David bay, and runs to the northward almost parallel to the coast for nearly 5 miles, terminating near Pagoua point.

Point à Peine is one of the most eastern points of the island. On either side is a deep indentation known as Grand Marigot on the N., and Petit Soufrière on the S. Over Point à Peine is a sharp hill which rises to the height

of 1,044 feet. The point forming the S. part of Petit Soufrière bay is Rosalie; S. of this is an estate of the same name, at the foot of a deep valley, which commences but a few hundred feet from the top of one of the highest mountains.

Point Mulatre is 2 miles northward of mount Paix Bouche, and is the commencement of a regular line of cliffs. La Plaine, on which stands a Roman Catholic church, is on the most level part of this land, and is distant 3 miles from point Mulatre. The Grand Soufrière range, 3,554 feet high, rising over point Mulatre and La Plaine, is connected by ridges with the main chain of mountains which runs through the island.

Mount Paix Bouche, 1,585 feet high, rising over the dark, steep, and rugged cliffs, is the continuation of a sharp and defined ridge of hills on the SE. part of the island, the highest point being 3,277 feet above the sea. The coast here is very steep, the depth of a hundred fathoms being found at little more than half a mile from the shore.

Grand bay, the principal and safest anchorage on the windward side of the island, lies in a northeasterly direction about 2 miles from point des Fous. The largest and best cultivated estate near the bay is Geneva, with a water-mill $\frac{1}{3}$ of a mile from the beach. Grand bay terminates in a comparatively low point called Carib. Under this point and close in shore, small vessels may anchor in from 5 to 10 fathoms and find shelter during the greatest strength of the trades, when the wind is N. and E. When the trade becomes slack, and inclined to veer round to the SE., the anchorage is not safe.

Morne Fous, 2 miles E. of Scott head, is a remarkable conical cliff, rising to the height of 1,251 feet. When viewed with the higher land as a background, the steep cliff which falls almost perpendicular to the sea has a most striking appearance, and when seen clear of the land it appears as a cone. The eastern extreme of this cliff is known as Point des Fous.

MARTINIQUE.*

The island of Martinique was discovered by Columbus in 1493, and in 1635 was settled by the French, to whom it now belongs.

Between cape St. Martin, at the NW. end of the island, and cape d'Enfer, on the SE., the island is 35 miles long, with a width varying from 7 to 16 miles. Its area is about 380 square miles, $\frac{1}{3}$ of the surface consisting of plains, the rest being mountainous. The mountains are very high and irregular, the island being easily recognizable from a distance by the peculiar shape of three of the peaks which rise above the rest and visible at a distance of 45 miles. The most northerly of these mountains is mount Pelée, 4,428 feet high, about 4 miles SE. of cape St. Martin. From a distance its summit appears of a rounded form.

The Pitons du Carbet, rising to a height of 3,960 feet, are about $3\frac{1}{2}$ miles from the W. coast, between the bays of St. Pierre and Fort de France. They form a group of rugged, conical peaks, with very steeply sloping sides, but their tops are generally hidden in the clouds.

At the southeastern extremity of the island, the most prominent peak is Vauclin mountain, 1,657 feet high, shaped like a flattened cone, and lying at the eastern extremity of a range of mountains which divides into two branches; one joining the heights which overlook the bays of Fort de France on the N. and Grand Anse du Diamant on the S. These mountains, with many others in the island, show evidences of being extinct volcanoes.

Emptying into the sea from the sides of the mountain-ranges are no less than 75 streams, of which only 2 are navigable; there are also 4 mineral springs.

The mountains in the centre of the island are covered with impenetrable forests.

The soil is generally formed of pumice, mixed with decayed vegetable matter; in the southern part being more fertile than the northern, where the land is barren and rocky.

Products.

The population of the island was, in 1870, 153,927.

The productions of the island are sugar, molasses, rum, coffee, cotton, cocoa, cassia, dye-woods, and annatto.

* See Hydrographic Office Chart No. 360, Island of Martinique.

Within the last few years extensive central factories for the manufacture of sugar and rum have been established at various places on the shores of the island. The system pursued, of purchasing sugar-cane from the planters and manufacturing the products in large quantities with every appliance of modern skill and science, has been of very great benefit.

The year is divided in Martinique into two periods of unequal length: the wet season, from July to October, and the dry season, lasting the rest of the year. The dry season only merits its name in comparison with the other, as a very considerable amount of rain falls during its continuance, and, although the showers do not last very long, they are copious and frequent.

The weather during the rainy season is much more variable and the rains heavier than during the so-called dry season.

The amount of moisture in the air is very great. The average range of the barometer is from 30ⁱⁿ.0 to 30ⁱⁿ.12, but on the approach of a hurricane it has been known to descend as low as 29ⁱⁿ.53.

At a height of 6½ feet above the level of the sea the maximum temperature in the shade has been found to be 95° F. and the minimum 68° F., while the mean yearly temperature is 78° 8 F.

During the dry season the winds are generally between E. and NE., without varying much either in direction or force; but during the rainy season they are far less regular, varying from ENE. to W., passing by the S. This is not only the most unhealthy season of the year, but also that of hurricanes, which frequently occur between July and October, and are often accompanied by more or less violent shocks of earthquake and heavy rollers. Hardly a year passes, in fact, without earthquake-shocks at Martinique.

From Macouba point, the northern extremity of the island, the coast-line sweeps round to the SW., S., and SE. for 11½ miles to La Mare point, the northern limit of the bay of St. Pierre. Between these two points the coast is bold, steep-to, and clear of danger, but affords no safe anchorages, on account of the great depth of water close in shore.

Pearl rock.

The Pearl rock, lying nearly 4 miles northward from La Mare point and $\frac{1}{4}$ of a mile off shore, is 85 feet high, and may be passed on either side. Sailing-ships, however, had better keep a little farther off shore, to avoid the calms under the high land, and the same vigilance must be exercised here that is required to leeward of all these i-lands, to guard against the squalls which rush down through the valleys.

The bay of St. Pierre lies between point La Mare on the N. and point Carbet on the S. These two points are 5 miles apart, and the shore between them is low and sandy.

St. Pierre.

The roadstead of St. Pierre is entirely open to the westward, and from July to November, when the trade-winds are interrupted and hurricanes and rollers occur, it is by no means a safe anchorage.

On the shore is the town of St. Pierre, the chief commercial port of the island, and having a population of 25,270.

The best anchorage for men-of-war is a little to the southward of St. Marthe point, about 400 yards off shore, in 20 fathoms of water. The bank of soundings extends a little farther off shore here than abreast of the town, is less steep, and is called the Plateau du Carbet.

On the edge of the bank there is a buoy, outside of which there is no good anchorage.

The anchorage for merchant-vessels extends from St. Marthe point northward to the river Pères, the northern boundary of the city. French vessels occupy the space S. of Place Bertin, those under other flags being moored farther to the northward.

A rocky patch about 250 yards long. N. and S., having from 7 to 15 fathoms of water on it, lies 1 cable off shore WNW. from the marine hospital. Vessels often moor here in 8 or 10 fathoms. On the western side of this bank the water suddenly deepens to 28 and 33 fathoms.

Caye de l'Hôpital.

The anchorage to the northward of Caye de l'Hôpital is narrowed very much by the shelving form of the bottom there, being $\frac{1}{4}$ of a mile off the mouth of the Pères river, from 75 to 90 fathoms of water.

In approaching the anchorage of St. Pierre, although the vessel may seem to be very close in shore, the anchor should

never be let go till the lead shows that the anchorage has been reached.

A *fixed white* light is exhibited from the battery on St. Marthe point and may be seen from a distance of 5 miles. Another *fixed* light is shown a short distance nearer the water and lower than the *white* light. The latter light shows *red* to the northward, *blue* to the W., and *green* to the southward. The *white* light in line with the *blue* light under it leads to the anchorage. Lights.

A lantern is placed on the mail-steamer's buoy when the steamer is expected.

The currents in the offing from St. Pierre road generally set to the southward. Currents.

Water of excellent quality can be procured at St. Pierre. Casks can be filled in the boats by iron pipes leading from the fountain near the landing-place.

The West India and Panama Telegraph Company have an office here, the submarine cable connecting the island with Dominica and St. Lucia.

Provisions, coal, and ship's stores can be had here of excellent quality.

There are also facilities for repairing steam-machinery.

The coast between St. Pierre and Fort Royal is steep, bold, and clear of danger. There are no good anchorages between the two bays, as the deep water is so close in shore.

Five and one-half miles southward from St. Marthe point is a small cove called Anse de Caye Pilote, on the shore of which is the village of the same name. There is anchorage in 20 fathoms $1\frac{1}{2}$ cables off shore. A very short distance farther out there are 40 fathoms of water. Anse de Caye
Pilote.

There is a similar cove, $2\frac{3}{4}$ miles farther to the SE. and $1\frac{1}{4}$ miles NW. of Negro point, called Anse de Navire. Here there is good holding-ground in 25 fathoms of water about 1 cable off shore, but 1 cable farther out a depth of 36 fathoms is found, with rocky bottom. The village of Anse de Navire is abreast the anchorage, on a low point which separates two sandy beaches. Anse de Na-
vire.

A stream of excellent water empties into the sea here.

The bay of Fort Royal has an entrance $3\frac{1}{2}$ miles wide between Negro point on the N. and Ramiers islet on the S. Fort Royal bay.

side. This islet is steep and rocky, 140 feet high, and crowned with a small fortification.

The bay is 7 miles deep, but its shores are deeply indented and irregular in outline, narrowing the bay very considerably to the eastward of the town. The various anchorages in the bay are well sheltered from all winds. The town of Fort Royal, the capital of the island, lies on the N. side of the bay, 1 mile ENE. from Negro point. It is built on a low plain, bounded on the W. by the river Madame, on the E. by the Carénage inlet, and on the N. by a canal joining the inlet and river.

This is the headquarters for the French naval forces in the West Indies. The anchorage for men-of-war lies off the town, and is protected by fort St. Louis, built on a narrow peninsula, rising abruptly from the sea and separating the anchorage called Flamands roads from the Carénage. A bank of gravel and rock extends $\frac{1}{2}$ a mile to the SW. and S. of the peninsula, with from 2 to 3 fathoms on its edge. A red nun-buoy, moored in $3\frac{1}{2}$ fathoms of water on the SW. extremity of the bank, marks its limit in that direction.

Good anchorage will be found in Flamands roads, with the flag-staff on fort St. Louis bearing NE. $\frac{3}{4}$ E. and Negro point from W. by N. to NW.

This anchorage is entirely open to the westward. During the hurricane season men-of-war are secured in Trois Islets anchorage on the S. side of the bay.

Lights. A *fixed white* light is shown from a mast on Negro point. The light is 62 feet above the sea, and can be seen from a distance of 8 miles.

A fixed light is shown from the S. part of fort St. Louis, showing *red* between the bearings of NE. and WNW., passing by the S., and *white* in other directions. It is 131 feet above the level of the sea and visible from 4 to 5 miles. The buoys are also lighted when a mail-steamer is due.

Vierge bank. To the westward of Flamands roads, and about $\frac{1}{2}$ a mile S. of Negro point, is the Vierge bank, a rocky knoll about 2 cables in extent and having a depth of 9 fathoms. It should be avoided in anchoring.

Mitan bank. The Mitán bank is a small coral head, marked by a conical black buoy and lying to the southward of the anchorage.

It has 4 fathoms of water and bears SE. from Negro point and SW. by S. from fort St. Louis.

Gros Islet bank is a small shoal nearly midway between Negro point and Ramiers islet. Its northern edge is marked by a square white buoy planted in $3\frac{1}{2}$ fathoms of water. Gros Islet bank.

This shoal is the northern extremity of the Fond Blanc or White shoal, extending northward from Ramiers islet. The bottom here is uneven and rocky. The light color of the water causes the outlines of the banks to be easily seen. The depth varies from $4\frac{1}{2}$ to 11 fathoms.

The approach to the anchorage in Flamands roads presents no difficulties whatever. Should it be necessary to go farther in, a pilot should be taken.

To anchor at night bring the light on fort St. Louis to bear E. by N. $\frac{1}{2}$ N. and steer for it. Anchor on that line when Negro point light bears WNW. The channel leading to the cove E. of fort St. Louis, called the Carénage, is buoyed, and the largest ships can haul alongside of the wharves there for repairs.

An excellent dry-dock has been completed belonging to the French government, capable of receiving vessels 360 feet long, 82 feet beam, (outside of paddle-boxes,) and drawing 26 feet. The dock-charges are $3\frac{1}{2}$ francs (67.2 cents) per ton for the first day, and 90 centimes (17.3 cents) for each succeeding day. Dock.

To the eastward of the Carénage and nearly 2 miles farther up the bay is an inlet forming a secure anchorage, called the Cohé du Lamentin. South of it on the S. side of the bay is another secure anchorage, called Trois Islets anchorage. This part of the bay is nearly cut off from the western portion by coral banks extending from both northern and southern shores of the bay, and the assistance of a pilot is necessary to conduct a vessel through the intricate channels leading to these anchorages.

There is but little tidal current in Fort Royal bay. It is high water, full and change, at 4^h, and the rise and fall is about 1 foot. Tides.

All sorts of supplies, provisions, coal, and naval stores can be obtained with ease at fort Royal. Water is supplied from government water-boats. Supplies.

At several places on the shores of Fort Royal bay central sugar-factories, or *usines*, have been established.

With the assistance of a pilot the approach to these factories is not difficult for vessels intending to load there.

Southwest $2\frac{1}{2}$ miles from Ramiers islet is cape Solomon, a bold headland, and 4 miles to the SE. of this cape is the Morne du Diamant or Diamond hill, conical in shape and rising abruptly from the water to a height of 1,568 feet.

Grand and Petite Anse d'Arlet and Petite Anse du Diamant.

Between these two prominent headlands are three small bays, Grande and Petite Anse d'Arlet, and Petite Anse du Diamant. The two former are separated by a bold promontory called Bourgos point. All three of these coves have sandy beaches and afford good temporary anchorage $\frac{1}{4}$ of a mile off shore in from 7 to 10 fathoms of water. There are no hidden dangers and the shore is perfectly bold as far as the E. side of Diamond hill.

Diamond rock.

Diamond rock rises abruptly from the sea to a height of 574 feet and lies 1 mile SE. of Diamond hill. A small bank extends $\frac{1}{4}$ of a mile off its N. and NE. sides, with from 4 to 6 fathoms on it. On the S. and W. sides it is steep-to.

Diamond bank.

The passage between this rock and Diamond hill, called Fours channel, is deep and clear. ESE. $\frac{3}{4}$ of a mile from the rock there is a small coral bank called the Diamond bank, having $4\frac{1}{2}$ fathoms on it.

On the S. coast of Martinique the 10-fathom line is within 1 mile of the shore, and the edge of the bank is so steep that the line of discolored water may easily be seen from aloft.

Anchorage on south side of Martinique.

Westward of Diamond hill are the following anchorages for small vessels: Grande Anse du Diamant, Anse du Mari-got, Anse du Ceron, and Anse des Trois Rivières. At the latter place a central sugar-factory has been established. There is also anchorage off the mouth of the river Pilote, passing eastward of St. Lucie cay, which is surrounded by reefs. In approaching the anchorage of Grande Anse du Diamant the Olbian reef must be avoided, lying $\frac{1}{2}$ a mile from the shore on the E. side of the bay, and having 6 feet of water on it.

Cul-de-sac Marin.

The bay of Cul-de-sac Marin, 10 miles E. of Diamond hill and 3 miles N. of the SE. point of the island, is an irregularly-shaped inlet, nearly 2 miles deep. The entrance be-

tween the shoals is so narrow that large vessels cannot work in under sail. The water is so clear that the shoals and rocks can be easily seen and avoided. The entrance is obstructed by the Singe bank, having only 3 feet of water on it and forming two channels at the entrance. The south-eastern channel is the best.

The eastern point of the entrance is flat and marshy, and is called Marin point. The best anchorage will be found with this point bearing SW. and the Piton Crève cœur, a hill 663 feet high on the eastern side of the bay, E. by S. $\frac{1}{2}$ S. In this berth a vessel will have 12 fathoms of water and good holding-ground. The anchorage nearer the town is only fit for coasters. At the head of the bay, near the village of Marin, a central sugar-factory has been established.

Salines point, the southern extremity of Martinique, is very low. Salines point.

Cabrit islet, $\frac{1}{2}$ a mile SE. of it, is also low, and foul ground extends for $\frac{1}{2}$ a mile to the SW. of the islet. The shore should not be approached in this neighborhood nearer than $\frac{3}{4}$ of a mile.

The eastern shore of Martinique, as far N. as the peninsula of Caravelle, is bordered by coral banks and reefs which extend off shore to a distance of $2\frac{1}{2}$ miles.

There are several passages through these reefs leading to harbors and anchorages inside.

The coast from Cabrit islet to the Vauclin pass, 10 miles to the NNE., where the main bank commences, is skirted by reefs at the distance of $\frac{1}{2}$ a mile to 1 mile.

Vauclin point is the extremity of a spur of the mountain of that name, from which it bears E. by N. $3\frac{1}{2}$ miles. The point terminates in a steep hill 216 feet high, which is the mark for entering the Vauclin pass. To do so bring this hill to bear NW. by N. and steer for it. This course will lead through the passage 200 yards wide between the reefs, with a depth of 7 to 8 fathoms. Vauclin point.

Brigot pass, $1\frac{1}{2}$ miles farther N., is the next opening, but it is too intricate to attempt without a pilot. Vauclin pass.

Pinsonelle pass lies between the cay of the same name and the Sans Souci cay to the southward of it, and lies $2\frac{1}{2}$ miles N. of the Brigot pass. To run through this passage Brigot pass.

Pinsonelle pass.

bring the Vauclin mountain to bear SW. by W. and steer for it till within the reef.

Pinsonelle cay. Pinsonelle cay is a dry, flat, rocky ledge between the Mitan and Pinsonelle channels. On the southern end of this cay the U. S. and Brazil mail-steamer Mississippi was lost in May, 1869. Her boilers are still visible there.

Caution. The establishment of central sugar-factories, or *usines*, at various points on the E. coast of Martinique and of neighboring ports of entry for the exportation of their productions renders it necessary to caution ship-masters as to chartering their vessels to load at those ports unless they have some previous knowledge of the locality.

Such factories have been established at Simon, François, Galion, and Ste. Marie. All these ports can be reached without much difficulty; but they are difficult to get away from owing to the strong NE. wind blowing directly on to this coast and the heavy sea.

No trustworthy descriptions of these ports and the approaches can be given. Generally the outlines of the reefs and shoals can be seen, especially when the sun is not ahead.

Except for those having local knowledge the assistance of a pilot is almost indispensable. Such a description of the anchorages and the channels leading to them will be given as may be of service in an emergency.

Currents. The currents on this coast are uncertain and are to a great extent governed by the wind. After a SE. wind they sometimes set to the NW. more than 3 miles an hour, and in approaching the channel between Martinique and St. Lucia from the eastward this must be borne in mind. The loss of the Mississippi and numerous other vessels was probably due to this cause, and many others have narrowly escaped going ashore on the reefs.

The two principal passages through these outer reefs are the Caracoli channel, close to the point of the same name, and the Mitan channel, 7 miles farther S. and midway between the Mitan cay and Thierry isle, $2\frac{1}{2}$ miles S. of it.

Mitan cay. Mitan cay is small and low. It lies $2\frac{1}{4}$ miles E. of Rose point and 6 miles S. by E. $\frac{1}{2}$ E. from Caracoli point. The

Loup-Garon, a similar small cay, lies 1 mile N. by W. $\frac{1}{2}$ W. from Mitan cay.*

Thierry isle is the easternmost of a small cluster lying $1\frac{1}{2}$ miles off shore. Its summit is rounded, covered with bushes, and about 100 feet high. Thierry isle.

Caracoli channel is formed by the N. end of the extensive off-shore coral-bank on the S. and Caracoli point on the N. It is the easiest of access and therefore the best of all the channels leading to the anchorages and bays inside the reefs. Caracoli channel.

Caracoli point is a bare, steep, rocky headland 95 feet high. The land slopes from the heights above down to the point, off which a coral reef extends about 200 yards. The N. end of the bank is 1 mile SSE. of the point; nearly midway between, however, is a small $5\frac{1}{2}$ -fathom patch which causes a heavy roller, and should be avoided by keeping Caracoli point close aboard. Caracoli point.

Caravelle peninsula, of which Caracoli point is the SE. extremity, is about 5 miles long but of very irregular breadth, varying from $\frac{1}{2}$ a mile to 2 miles. The narrow isthmus which connects the peninsula with the main land is only $\frac{1}{2}$ a mile wide and separates the two bays of Trinité and Galion. Farther to the eastward the land is higher, gradually rising to the summit of mount Tartane, which is surmounted by a semaphore 623 feet above the level of the sea.

At the extremity of the peninsula, on Caricoli hill, is a white tower from which a *fixed white* light is exhibited at a height of 410 feet above the sea. The light should be seen in clear weather from a distance of 18 miles. The tower stands $\frac{1}{4}$ of a mile inland. Light.

The Caravelle rock, lying $1\frac{3}{4}$ miles N. of the eastern extremity of the Caravelle peninsula, affords an excellent landmark for vessels approaching this part of the island. It is steep-to, quite barren, 95 feet high, and its peaked summit has been completely whitened by birds. From a distance it looks like a vessel under sail. The channel between the Caravelle peninsula and this rock is deep and free from danger. Caravelle rock.

Galion bay is on the S. side of the Caravelle peninsula,

* The word *Loup* is used in Martinique to signify a rock or shoal nearly awash.

Ramville islet. between Caracoli point and Ramville islet, 4 miles S. by W. from it.

The latter is 328 feet high and has a round bushy top. Immediately to the eastward of Caracoli point is a small cove called the Cul-de-sac Tartane, but it is filled with reefs and is inaccessible.

Galion bay lies on the S. side of the neck of land connecting the promontory of Caracoli with the main-land. The W. coast of the bay is deeply indented, forming several small coves fringed with coral reefs, making landing difficult with a heavy sea. Galion river empties into the bay a short distance to the SW. of the remarkable conical, wooded island of the same name. On the bank of the river, about $\frac{1}{2}$ a mile from the mouth, is a central sugar-factory, the products of which are shipped from this port. This anchorage, although not difficult to approach, is difficult to leave. Vessels approaching the anchorage should pass close to Caracoli point, and, giving the coast a berth of $\frac{1}{3}$ of a mile, should haul close round Brunet point, where the coast suddenly trends to the northward, and should anchor with the latter point bearing about SE. $\frac{1}{4}$ of a mile distant.

It is said that pilots cannot always be depended upon, as they frequently do not present themselves till the vessel is close to the anchorage and no longer needs their assistance.

In beating out great care must be taken to avoid the numerous shoals which abound in this neighborhood, and for which the chart will be the best guide. With the wind at NE. or even ENE. vessels leaving Galion bay are recommended to go to sea through the channel S. of Miton cay, a low rock, lying 6 miles S. by E. $\frac{1}{2}$ E. from Caracoli point.

The assistance of a pilot is necessary.

Connected with Ramville islet by a coral reef, and lying just to the southward of it, are Gratte islet and the rock of the same name. This islet and rock form the N. side of the entrance to Robert harbor. The entrance is about 900 yards wide, and is limited on the southern side by the islets of Chardon and La Rose, also rising from coral reefs nearly dry. Robert harbor is quite large and well sheltered by the reefs lying abreast of the entrance. The soundings diminish gradually from 11 or 12 fathoms at the entrance to $4\frac{1}{2}$

fathoms near the reefs which line the shore. The coast-line of the bay is much indented, forming numerous coves which afford excellent shelter for small craft.

A mile and three-quarters to the westward of Grotte rock is the islet of Petit Martinique, to the westward of which is the best anchorage for large vessels. Here smooth water and good holding-ground will be found with from 5 to 6 fathoms of water.

Abreast of the town from 13 to 16 feet of water will be found.

The town of Robert lies on the NW. shore of the bay. It contains about 6,500 inhabitants, and moderate quantities of provisions may be obtained.

The tides rise and fall in Robert harbor about 4 or 5 feet, but are very much affected by the winds.

After a ship is inside of Caracoli point the entrance to Robert harbor is very easy as the reefs on each side of the entrance are visible and are steep-to. To leave the harbor is more difficult for the reasons already stated.

Vessels should not haul to the southward, to round the reefs to the eastward of Chardon islet, till the semaphore on mount Tartane can be seen outside of Ramville islet. When this line is passed vessels may keep away to the southward so as to pass $\frac{1}{2}$ a mile S. of Mitau cay, when they will be clear of all danger. The semaphore on mount Tartane kept on with Mitau cay will clear all the reefs on the SE. coast of Martinique.

About 8 miles to the southward of Caracoli point are the anchorage and town of François, where a central sugar-factory has been established. The town lies at the head of a small bay about $\frac{3}{4}$ of a mile deep, and the anchorage is well sheltered and has excellent holding-ground. It is, however, so surrounded by reefs and shoals, and the channels are so narrow, that the assistance of a pilot is indispensable.

The anchorages of Frégate, Simon, Sans-Souci, and Vauclin are small coves where small vessels may, with the assistance of a pilot, find good anchorage. At Simon there is a central sugar-factory. As the water is everywhere very clear the shoals are easily seen, particularly in good weather, and when the sun is astern.

Trinité bay. Trinité bay,* northeast of the Caravelle peninsula, affords a safe anchorage during ordinary winds, and next to St. Pierre and Fort Royal, is the most important commercial port, having a population of over 7,000. It lies about SW. 6 miles from the Caravelle rock. The bay is somewhat sheltered to the northward by a shallow, rocky bank, on which there are several dangerous shoals. The bank extends to the WNW. nearly 6 miles from the Caravelle peninsula. The irregular depths on the bank raise so rough a sea that large vessels from the northward had better pass between the western end of the bank and the shore than try to cross it.

The northern side of Caravelle peninsula forms the eastern shore of Trinité bay. It is composed of low, reddish cliffs and sandy bays, skirted at a distance of 1 to 3 cables by a coral reef, on which the sea generally breaks.

St. Aubin islet. St. Aubin islet, on the western side of the bay, and $\frac{3}{4}$ of a mile from the shore, is an excellent landmark in approaching Trinité bay. This islet is high and steep, with a round, bushy summit. Its north side is steep-to, and clear of danger, but to the ESE. it is foul for $\frac{1}{4}$ of a mile, and its south side is joined to the shore by a coral reef nearly dry in places.

Loup-Ministre. Near the entrance to Trinité bay, and lying $2\frac{3}{4}$ miles west of Diable point, the northern extremity of the peninsula, is a small reef called Loup-Ministre. It has 6 to 9 feet of water on it, and, as the sea breaks heavily on it at nearly all times, it forms a useful guide to the entrance of the bay.

Between this reef and Caravelle peninsula there are many other reefs, which make the passage to the eastward of the reef very dangerous.

Loup Sainte-Marie. The western end of the bank on which the Loup-Ministre lies terminates about $1\frac{1}{2}$ miles north of St. Aubin islet, but rather less than 1 mile farther to the WNW. is the Loup Sainte-Marie, a bank 600 yards long north and south, and about 200 yards wide, with $5\frac{1}{4}$ fathoms of water on it. With strong NE. winds the sea breaks heavily on it.

There is a clear channel between this shoal and the west end of the Loup-Ministre bank, as well as between it and

* See H. O. Chart No. 361, Trinité bay and anchorages in Martinique.

St. Marie islet, lying 1 mile to the SSW., in front of the village of the same name, and joined to the main-land by a sandy bank.

The Beau Sejour mill (situated on the isthmus connecting Caravelle peninsula with the main-land) kept open a little to the eastward of St. Aubin islet carries a vessel to windward of the Loup St. Marie; kept open to the westward it leads to leeward of the same danger.

The Mitau bank is small, with 11 feet of water on it. It lies ESE. 1 mile from St. Aubin islet, and is on a line between Fort point on the W. side of Trinité bay, and the Loup Ministre shoal, which always breaks.

Mitau bank.

A vessel approaching Trinité bay from the northward should keep well to windward, and should not bring the Caravelle rock to the northward of E. till Beau Sejour mill bears SSE. $\frac{1}{3}$ E., when the mill will be seen just open to the eastward of St. Aubin islet, and the vessel will be $\frac{1}{3}$ of a mile to windward of Loup St. Marie. Then steer for the E. end of St. Aubin islet, and when the breakers on the Loup Ministre bear ESE., or St. Marie islet bears W. $\frac{1}{2}$ S., the vessel is inside the reefs, and a course may be shaped to pass about $\frac{1}{2}$ a mile NE. of St. Aubin islet.

Directions

From here the course for the harbor is S. by W., avoiding by the eye the neighboring shoals, and taking care to keep clear of the Mitau bank.

There is good outer anchorage in $8\frac{1}{2}$ fathoms of water, NE. $\frac{1}{2}$ N. from Fort point, with Beau Sejour mill SE. by E., or, if desirable, a berth farther in may be reached, keeping clear of the shoals on either side, which are easily seen.

With the wind from E. or SE. a vessel must beat in, and in order to avoid Loup Ministre bank, should it not break, St. Aubin islet should not be brought to the southward of S. by E. till it is within 1 mile of the vessel.

With the prevailing winds, it is usually difficult to leave the bay. In beating out, the eastern reefs which are visible should be kept aboard until the reef, stretching off 400 yards from Fort point, can be cleared. After this is done, the edges of the channel are plainly marked by the breakers. Care must be taken to keep clear of the Mitau bank.

Sainte Marie
anchorage.

Six and a half miles W. by N. from the northern point of Caravelle peninsula, and immediately to the northward of Ste. Marie islet, is the mouth of the river of the same name. A central sugar-factory has been established near the mouth of the river, but the anchorage off it is very much exposed and is unsafe.

The locality is marked by the chimneys of the *usine*. Vessels lie in from 5 to 8 fathoms of water about half a mile off shore.

From Sugar-loaf point, 3 miles NW. of St. Aubin islet, to Macouba point, the coast is bold, steep-to, and affords no anchorage. It consists of small, sandy bays, separated from each other by bold, rocky bluffs, and is exposed to the full force of the wind and sea.

St. Esprit reef.

The shoal known as the St. Esprit reef was first reported by the French vessel of that name, as seen while on a voyage from Marseilles to Martinique in 1817, and was again reported by H. M. S. *North Star* in 1833, and was said to be in latitude $14^{\circ} 40' N.$, longitude $59^{\circ} 38' W.$

In consequence of the apparently clear account of soundings having been obtained in this position by the latter vessel, a most minute examination of the immediate neighborhood was made in January, 1834, by no less than six vessels of war, but no trace whatever was found of either shoal or soundings. In 1866, however, soundings from 40 to 80 fathoms over a bank about 18 miles to the westward of the above position, and extending NW. and SE. for about 10 miles, were obtained by H. M. S. *Buzzard*, and which were verified by H. M. S. *Wolverine* in the same year. This bank was searched for without success by H. M. S. *Gannet* in 1866-'67, by H. M. S. *Jason* in 1869, as also by H. M. S. *Sirius* in 1872. St. Esprit reef has been expunged on the British Admiralty charts.

It has again been reported by Captain Raarup, of the Danish brig *Venus*, who states that on May 18, 1876, he saw the reef extending in a north and south direction, and that its position is in latitude $14^{\circ} 40' N.$, longitude $59^{\circ} 10' W.$

ST. LUCIA.

The island of St. Lucia was first settled by the French in 1635, and after various changes came into possession of the

English in 1803, and has ever since remained in their hands. The traces of French occupation are still apparent, a large portion of the population speaking that language.

The island is nearly oblong in shape, about 25 miles long NNE. and SSW., and from 7 to 15 in width.

It is mountainous and broken throughout, excepting a small plain at the southeast end. The volcanic peaks rise to a great height; the highest one, called the Soufrière, at the southwest end of the island, can be seen at a distance of 55 miles. The vapor which issues from its crater may be seen from a considerable distance. Near the base of this mountain are two conical rocky peaks, between 3,000 and 4,000 feet high, called the Pitons, or Sugar-loaves. They lie north and south of each other, $1\frac{1}{2}$ miles apart, the southern one forming the southwest point of the island.

The island is covered with valuable timber for building and cabinet purposes as well as dye-woods. The low lands are covered with swamps and marshes, making the island very unhealthy. Venomous snakes and insects abound.

The exports are cocoa, coffee, molasses, rum, sugar, and a small quantity of cotton.

In 1871 the population was 31,811. The shores of St. Lucia have not been thoroughly surveyed, and no good description can be given of its eastern shore, which, however, does not appear to have any secure anchorage. It is said to be free of danger, with the exception of the Champigny bank, 2 miles long, lying about 1 mile off shore and 3 miles to the southward of the northeast part of the island. This part of the island is only visited by the droghers which collect the produce and bring it to the harbors on the east side for export.

The NW. point of the island is called Gros-Cap point; 1 mile SW. of it is Gros or Pigeon island, high, bold, steep-to, and surmounted by a fortification called fort Rodney. It lies about $\frac{1}{2}$ a mile from the shore, with a channel for small coasters between. In the channel are two large rocks called the Burgots. To the southward of Pigeon islet is Gros Islet bay, the southern limit of which is Fourreur or Barrel of Beef islet, small, low, and rocky, about $\frac{1}{4}$ of a mile off shore, $1\frac{1}{2}$ miles to the SW.

Gros Islet bay is about 1 mile deep and affords excellent anchorage.

Champigny
bank.

Burgots rocks.

There is no danger in approaching it, and either point may be rounded at 200 yards distance. The best anchorage will be found with Pigeon island bearing NW. by N. and Fourreur islet SW. $\frac{1}{2}$ S. in $5\frac{1}{2}$ fathoms water, sandy bottom. Care should be taken not to go farther in, as at $\frac{1}{4}$ of a mile from the shore there are only 2 fathoms of water.

There is a village on the eastern shore and a watering place on the S. side of the bay.

Brelotte point is the southern point of Gros Islet bay; between it and Port Castries, 4 miles to the southward, is a bight called Anse du Choc, affording anchorage in 6 or 8 fathoms of water, to the westward of a small islet lying in the centre of the bay, not far off shore.

Brelotte shoal. In this bight there is a rocky shoal nearly 1 mile long and 400 yards wide lying parallel to and $\frac{1}{2}$ a mile off shore, its N. end bearing S. by E. $1\frac{1}{2}$ miles from Brelotte point.

To avoid it keep the W. side of Pigeon islet open of Brelotte point. This is the only danger on the western side of St. Lucia.

Port Castries. Port Castries lies about 9 miles S. of Pigeon islet, and is an excellent harbor. It is more than 1 mile long ESE. and WNW., and from 300 to 500 yards wide. At the head of the inlet is the town of Castries, the capital of the island, having a population of 4,000.

Castries is a coaling-station for the steamers of the Royal Mail Company and is the most convenient place for coaling in the Windward islands. Coal may always be purchased here at reasonable prices, as well as ship's stores of all kinds. It is a place of resort for whaling-schooners.

There is a clear passage to the coaling-wharf with 22 feet of water alongside of it.

Light. On Tapion rock, the S. point of the entrance to port Castries, a *fixed red* light is exhibited for mail-steamers when expected, 80 feet above the sea, and visible 3 miles; for the same purpose a *fixed green* light is shown from the outer edge of the Cocoa-nut shoal, on the S. side of the harbor, and a *red* light from that of the Vieille Ville shoal on the opposite side; there is also a *fixed white* light on the wharf at the town.

Directions. When bound to port Castries from the northward, which is the best route, having passed Gros islet, the entrance

may be easily recognized by the high, bold bluff, 295 feet high, which forms the N. point, having on its summit a small fort and signal-tower, but the narrow entrance will not be seen until nearly abreast it. This point, named Vigie, is steep-to, therefore haul sharp round it within 100 yards, and anchor as close under the N. shore as can be conveniently done for weighing.

Coming from the southward, the position of the port is as readily pointed out by the barracks on the Morne and the government house in a clump of trees just below the barracks. Tapion rock is low, with a small fort and light-house on it. A shoal extends for nearly 450 yards in a WNW. direction from the rock, having 4 fathoms at its outer extreme, and 16 feet at the distance of 200 yards. The NW. point of St. Lucia open of a dark bluff point S. of it leads westward of this shoal in 7 fathoms water, and the battery within Tapion rock well open clears to the northward.

In general, during the middle of the day, the wind rushes down the port with great violence; every preparation should therefore be made to give a good scope of cable in bringing up, to prevent dragging, and it will, perhaps, be found more safe and convenient not to commence warping in until the breeze slackens, which is usually the case from toward evening to about 10 o'clock the following morning.

In warping, be careful to keep in mid-channel, for shallow, rocky flats extend off most of the points; but the water is here so clear that, with the sun unclouded, they are readily seen and avoided. The SW. edge of the Vieille Ville shoal on the N. side of the harbor, the outer edge of the Coconut shoal on the S. side, as also the S. edge of the central shoal, together with the northern and western edges of the harbor shoal off the town are marked by perches. Nearly midway between point Bananes and the central shoal there are two mooring-buoys for the mail-steamers.

Two miles SSW. of Tapion point is Grand Cul-de-sac bay, ^{Grand Cul-de-Sac bay.} where a *usine*, or sugar-factory, has been established. A pier has been constructed for convenience of loading lighters. Good anchorage is afforded for the vessels which load here. The river Cul-de-sac empties into the NE. side of the bay.

Roseau bay lies 2 miles S. of Grand Cul-de-sac, and between them is a remarkable little inlet called the Marigot ^{Roseau bay.}

de Roseau, leading into two deep basins, capable of holding two or three large vessels and several small ones, with perfectly sheltered anchorage. This vicinity, however, is exceedingly unhealthy.

Roseau bay. Roseau bay, 1 mile SW. of the Marigot, is small, and its banks are steep-to, there being a depth of 15 fathoms within 200 yards of the beach.

The coast between Roseau bay and Soufrière bay, 10 miles to the southward, is bold, and in places rises vertically from the sea.

La Raye bay. Between the last-named bays is a cove called La Raye bay, on the shore of which is a small village of the same name. There are 10 fathoms of water in La Raye bay $\frac{1}{2}$ a cable from the beach.

Soufrière bay. * At the SW. end of St. Lucia, immediately to the northward of the Little Piton, 1,100 feet above the sea, the shore bends round, forming Soufrière bay, about 2 miles deep, sheltered from SSW. round by E. to WNW.; the shore all around, however, is so bold that there are 30 fathoms water at less than a cable from the beach, and 3 fathoms only 10 yards from it; it therefore possesses no convenient anchorage; still it is visited by merchant-vessels, which load here, moored stern on to the shore.

The town of Soufrière is next in importance to Castries, and contains about 1,800 inhabitants.

In entering Soufrière bay the wind must be guarded against, as it rushes off from the valleys with such force as to endanger the spars; therefore, before entering, sail should be reduced, and if the breeze outside is strong, a reef taken in. When beating in, the wind will be found more steady on the S. side than on the N.

Having approached to within a short distance of the town, a strong hawser should be sent to the shore and made fast to one of the trees on the beach in front of it, and another hawser coiled in a boat ready to leave the ship and bend on, if required. The moment the end of the hawser is on board all sail must be quickly furled, for should it part it would be useless to drop the anchor, as it would immediately drag into deep water.

It will be necessary to hang the vessel by the stern by a stream-chain from either quarter, and drop a bower-anchor on the edge of the bank, in case the wind should veer to

the westward; this, however, never takes place except in the hurricane months, and at all other times the sea is as smooth as in a mill-pond.

About half way between Gros Piton and Moulacique points, the SW. and SE. extremities of the island, is the bay of Ballenbouche, off which a reef, which does not always break, extends out upward of 1 mile, leaving between it and the shore a boat channel in moderate weather. In running down or beating up, the reef will be avoided by keeping the Great Piton just open of the land to the eastward of it; the water shoals rapidly on nearing the reef, but the lead is a safe guide either by day or by night.

At a short distance to the westward of Ballenbouche is the river Dorée, off which there is anchorage in 5 or 6 fathoms water, good holding-ground, sand, but at nearly $\frac{1}{2}$ a mile from the shore, with the Little Piton open eastward of the Great Piton, bearing about N. by W., and Dorée church NE. $\frac{1}{2}$ E., but it is exposed to the prevailing trade-winds. In the dry season the river is scarcely seen from seaward, being then narrowed at the mouth to a few yards, but during rains it rushes down with force and overflows the banks. The landing here is not good. A little farther on there is also anchoring-ground in 7 fathoms off the village of Choiseul, about $\frac{1}{4}$ of a mile from the shore, abreast the church that stands on the beach.

River Dorée.

Water and wood may be obtained at Choiseul in case of need, and vessels bound to windward, being unable to stem the current, will find the above anchorages convenient stopping-places. Between Choiseul and the Ballenbouche reef there is no danger.

The little bay and village of Laborie lie 3 miles to the eastward of Ballenbouche. The shore is skirted at a short distance by a reef, within which there is shelter for small vessels only.

Between the Moulacique peninsula at the SE. point of the island and Caret islet, NW. from it, distant 2 miles, is Vieux Fort, or Old Fort bay. With the usual trade-winds this capacious bay affords excellent anchorage and shelter. There is no danger whatever. On the NE. side of the bay, about 50 yards from the shore and nearly abreast the mouth of the river, is a small rocky ledge, steep-to, and nearly awash.

Vieux or Old
Fort bay.

Good anchorage within $\frac{1}{4}$ of a mile of the shore will be found in 5 fathoms of water, with the village church bearing NE. by N. and Moulacique point S. by E., or farther out in 12 fathoms, with the church on the same bearing and the western point of the island NW. by W.

Turtle, fish of various kinds, and fruit may be had in abundance.

Currents.

The current around St. Lucia runs generally with great strength to the WNW. and NW., more particularly in the passage between it and St. Vincent. Within 2 or 3 miles of its S. and W. sides, however, there is often a strong eddy which will assist a vessel in beating to windward. The native fishermen say there are periodical changes in the currents that observe great regularity, and of which they avail themselves to catch fish, always going out when the current sets to windward.

ST. VINCENT.

The island of St. Vincent was discovered by Columbus in 1498, and has been in the possession of the English since 1783. The island is oval in shape, about 13 miles long N. and S. and 8 miles wide. It is separated from the island of St. Lucia by a channel 22 miles wide.

A lofty range of mountains running N. and S. occupies the centre of the island, mount Souffrière, in the NW. end of the island, rising to a height of 3,000 feet. This mountain is volcanic, and may be seen at a distance of 55 miles. On its NW. side it rises abruptly, but on its NE. side it gradually slopes to an extensive plain.

The shores are almost everywhere bold and rocky, with, however, several sandy bays where coasters load produce for Kingstown, the capital of the island and place of export.

The climate is said to be healthier than that of any of the other West India islands.

The principal exports are sugar, rum, molasses, cocoa, arrowroot, and a mineral cement called *pozzuolana*, made from volcanic ashes. The population in 1871 was 35,638.

Kingstown bay
and anchorage.

On the SW. side of St. Vincent is Kingstown bay, the principal anchorage, on the shore of which is the town of the same name, the capital of the island. This bay lies between Old Woman point, low and steep-to, on the NW., and Cane

Garden point, also steep-to, on the SE. side. On the hill just back of Old Woman point is fort Charlotte, with the barracks and hospital, 637 feet above the sea.

The town lies along the shore of the bay and backed by the mountains.

Kingstown bay is about 1 mile wide at the entrance, and $\frac{3}{4}$ of a mile deep. The water is deep all over the bay, there being from 18 to 20 fathoms $\frac{1}{4}$ of a mile from shore.

Good anchorage will be found with the church bearing from N. to N. $\frac{1}{2}$ E. in from 10 to 20 fathoms within $\frac{1}{4}$ of a mile of the shore.

A good scope of chain must be veered, as the wind frequently comes off the shore in heavy gusts.

A *white* light is shown from fort Charlotte when mail-steamers are expected. The light is 640 feet above the sea, and can be seen 6 miles. Light.

It is high water, full and change, at Kingstown at 6^h 0^m, and the rise at spring-tides is about 1 $\frac{1}{2}$ feet. Tides.

The submarine cables of the West India and Panama Telegraph Company connect Kingstown with Barbados, St. Lucia, and Grenada.

On the S. side of the island, 1 $\frac{1}{2}$ miles WSW. of Cane Garden point, are Young and Duvernette islets. The latter is the outer and smaller of the two, is conical in shape, 204 feet high, and surmounted by an old fort. Young and Duvernette islets.

These islets are bordered on the E. and S. sides by a rocky bank extending off 1 cable.

There is a narrow 5-fathom channel between these islets and the main-land.

Calliaqua or Tyrrel bay, immediately E. of these two islets, is a secure anchorage, but is now only frequented by coasters. Between this bay and Young island a reef runs 2 cables off shore to the southward. Calliaqua or Tyrrel bay.

On the E. side of Calliaqua bay is a small, snug harbor, sheltered by the reefs, and called the Lagoon, with 6 to 9 fathoms of water, muddy bottom, but the entrance through the reef from the SW. is only 2 fathoms deep. The Lagoon.

As the shores of St. Vincent have not been thoroughly surveyed, no complete description can be given of them.

On the western side of the island, about 3 miles NW. of Old Woman point, is Layon or Rutland bay, having at $\frac{1}{2}$ Layon or Rutland bay.

cable off shore 20 to 25 fathoms of water. The SE. point is steep-to, and this side of the bay is sandy. The NW. side is rocky, and a small reef extends from the point.

Princes or Bar-
rawally bay.

Princess or Barrawally bay lies about $5\frac{1}{2}$ miles NW. of Kingstown. Its N. side is formed by some remarkable rocks, called the Bottle and Glass, which are clear of danger, and have a boat-channel within them. If coming from the northward, haul close round these rocks and anchor in 20 fathoms of water, sandy bottom, with the rocks bearing NW. and the barracks NE. by E. $\frac{1}{2}$ E. The bottom on the N. side of the bay is foul. The wind is so variable and unsteady under the high land that if intending to remain any time it will be better to warp in, and drop a second anchor to the eastward in about 12 fathoms. If coming from the southward, the shore may be kept aboard equally close, and the vessel may probably shoot far enough in to drop the inner anchor first. The water being deep so close in, the anchorage is only fit for small vessels.

Anse Morluse
or Winn's bay.

Water may be obtained from a stream at the head of the bay. The points of Anse Morluse or Winn's bay bear about N. by W. and S. by E. from each other, with soundings across from 10 to 12 fathoms about 1 cable from the shore. The N. point is foul.

Boccamaw bay.

Boccamaw bay is noted for the stream of excellent water which flows into it. It lies NNW. and SSE., with a depth of 26 fathoms across, within $\frac{1}{2}$ a cable of the shore; a vessel may anchor at that distance off shore, a little to the northward of the river, in 17 fathoms of water.

Chateau Belair.

From the Bottle and Glass rocks the shore runs N. by E. $\frac{1}{2}$ E. to a bluff called Cumberland point, the NW. extreme of St. Vincent; it is all along bold, and a vessel may stand in to $\frac{1}{2}$ a mile from the shore. Between are several small bays; Chateau Belair, the largest, and about 13 miles from Kingstown, affords anchorage at about 2 cables off its eastern shore in 13 or 14 fathoms of water, with the N. point of the bay bearing N. $\frac{1}{4}$ E., the W. point W. by S., and the town S. by W. $\frac{1}{2}$ W.

In the middle of the bay there is no bottom with 50 fathoms, nor on the W. side with 30 fathoms, at $\frac{1}{2}$ a cable from the shore. The landing is not good, and with northerly winds a heavy surf rolls in on the beach. Chateau Belair

is separated from the little bay southward of it by Wood islet, which is about $\frac{1}{4}$ of a mile in length, lying in a north-westerly direction. Between the islet and the point is a narrow passage carrying $6\frac{1}{2}$ fathoms of water, used by boats and sometimes by droghers.

THE GRENADINES.

The Grenadines form a chain of about 100 islands, cays, and rocks, 60 miles long north and south, lying between St. Vincent and Grenada.

They, with the adjacent islands, were discovered by Columbus in 1498, and were settled by the French about 1650. They are now in the possession of the English government.

The islands are of moderate height, none exceeding 1,100 feet, and have no off-lying dangers. They may be safely approached either in the day-time or by moonlight, and have several channels between them.

On the eastern side the 100-fathom line is about 10 miles from the islands, but on the western side is much nearer.

Bequia island, the northernmost as well as the largest of the Grenadines, is 880 feet high, $6\frac{3}{4}$ miles long NE. and SW., of irregular breadth, its coast-line forming several bays.

Bequia island.

It lies 6 miles to the southward of St. Vincent. Its population is about 900, all of whom are utterly lazy and apathetic. The island is attached to the government of St. Vincent.

Admiralty bay, on the western side of the island, affords good anchorage, though open to the SW. The wind, however, rarely blows from that direction; but if such an unusual event should occur the sea would be broken by the banks which project from the shores of the bay.

Admiralty bay.

In approaching Admiralty bay from the northward, the Wash rock, lying $\frac{1}{8}$ of a mile south of the NW. point of the island and 100 yards of the north point of Rocky bay, is avoided by keeping the NW. point to the eastward of N. by E. till Fort point, on the SE. side of Rocky bay, bears W. After passing the Wash rock, a vessel drawing more than 17 feet should steer clear of the 3-fathom bank, extending from the north side of the harbor. The leading mark to clear this bank is the principal house at the head of the bay on with the notch in the high land behind it, bearing NE. by E. $\frac{1}{4}$ E. The eye is the best guide, however, the

outline of this bank and that of the Belmont shallows on the south side of the bay being distinctly visible when close to; but great care is required, as the channel is quite narrow. Water and supplies cannot be easily obtained here, or of good quality.

Friendship bay. Friendship bay is a circular indentation, about $\frac{1}{3}$ of a mile wide, on the southeast side of Bequia island, affording anchorage and shelter to vessels of 10-feet draught. It is formed by St. Elair point on the east, and the cay of the same name on the west, the cay being joined by a reef to Bequia. The channel is midway between the cay and point. This place is frequented by American whaling-schooners.

St. Elair cay, Semples cay, and Petit Nevis islet, 325 feet high, lie immediately to the southward of Bequia, and between it and Quatre isle.

Quatre isle. Quatre isle, $1\frac{1}{6}$ miles south of Bequia, is 460 feet high, $1\frac{1}{2}$ miles long, with projecting points on the E. and SE. sides, forming little bays. Pigeon islet, 220 feet high, lies $\frac{1}{3}$ of a mile off its west end. To the westward of these islets and cays is an open space of moderately smooth water, affording safe anchorage except in the hurricane season.

There are four channels formed by these islets and cays which might be used in case of emergency. As a general rule keep in mid-channel, except between Quatre island and Petit Nevis, where keep nearer Quatre to avoid a shoal off the SW. end of Petit Nevis, on which the sea generally breaks.

Battowia isl. and. Battowia island, bold, steep-to, and 686 feet high, lies about 5 miles SE. of Bequia, and is the easternmost of the Grenadine islets. Close to its north end is the Bullet, a conical rock 318 feet high, having a breaker about 300 yards northwest of it.

Baliceaux isl. and. Less than $\frac{1}{2}$ a mile SW. of Battowia island is Baliceaux island, $1\frac{1}{4}$ miles long and 430 feet high. Off its western side is a 5-fathom bank, on the edge of which a vessel may anchor, but the water is not smooth. Close to the island, on the northwest side, there are two shallow patches, and an uncovered reef on the southwest side of the island.

At the north end of the island is Cactus cay, 63 feet high, and at $\frac{1}{4}$ of a mile north of it is Black rock, 41 feet high, with a 2-fathom shoal between.

Church cay and reef lie between Battowia and Baliceaux islands, forming two narrow channels with 2 fathoms of water in them.

All-awash is a prominent rock, 223 feet high, lying $1\frac{1}{6}$ miles south of Baliceaux. It is steep-to, and can be passed on either side. All-awash.

Mustique island lies 3 miles SSW. of Baliceaux, and 5 miles SE. of Quatre island. It is $2\frac{1}{2}$ miles long, 1 mile wide, and its south end is 495 feet high. Mustique isl-
and.

The east side of the island is skirted by a reef, and off it is Rabbit islet with the Brooks 60 feet high, and other rocks; but as there is no anchorage here a vessel should avoid this side of the island.

A shoal having 9 feet of water on it, and on which the sea breaks, lies $\frac{1}{2}$ a mile east of the south end of the island.

An indentation on the western side of the island, called Grand bay, affords temporary anchorage. To approach it, a vessel should pass west and northward of the Montezuma shoal, and enter between it and the north point of the bay, or make short tacks in the south part of the bay. The Montezuma shoal is about 350 yards in diameter with only 3 feet of water on it, and lies $\frac{1}{2}$ a mile from the north extreme of Grand bay, or the middle point of the island. The shoal is extremely dangerous, as when the water is smooth it does not break, and cannot be seen until too late to avoid it. A vessel may also anchor north of the shoal off Cheltenham, in the NW. part of the island.

Close off the N. end of Mustique is the Double rock, 20 feet high, and at $\frac{2}{3}$ of a mile farther is the Single rock, 15 feet high. The channel between the rocks has from 7 to 8 fathoms water. The Pillories are three islets in a WSW. and ENE. direction over a space of about $\frac{2}{3}$ of a mile. They are from $\frac{3}{4}$ to 1 mile N. of Mustique. The western islet is 65 feet high, the middle 85 feet, and the easternmost and largest 190 feet. Between these islets and the Single rock is a narrow passage carrying $3\frac{1}{2}$ fathoms water. The above channels may be taken by small vessels from E. to W., but only in cases of urgent necessity. Pillory islets
and rocks.

A group of rocks, partly uncovered and the largest 70 feet high, lies ENE. of the great Pillory; they are named the Pillory rocks, and between them and the islets there is

a clear channel $\frac{1}{2}$ a mile wide, with 8 and 9 fathoms water, but there is a rock 8 feet above water on which the sea generally breaks, to windward, or SE. by E. $\frac{1}{2}$ E., distant $\frac{2}{3}$ of a mile from the great Pillory, and at only $\frac{1}{2}$ a mile from the great Pillory, in the same line, is another rock awash, and always to be seen. It will be prudent to give these rocks a berth.

Petit Mustique
islet.

Petit Mustique, lying 1 mile S. of Mustique island, is 340 feet high and about $\frac{1}{2}$ a mile in length NW. and SE. A rock, uncovered, lies 200 yards off the S. point of the islet, and another rock, 1 foot above water, at $\frac{1}{3}$ of a mile south-westward of the W. end of the islet, leaving a narrow channel between. The Petit cay, 75 feet high, and surrounded by a reef, lies at about $\frac{1}{4}$ of a mile off the N. extreme of the islet. The water is shoal for about 300 yards N. of it.

The channel separating this islet from Mustique island has a depth of 7 fathoms, and is clear of danger, except the reefs extending 300 yards from Petit cay and the SW. end of Mustique.

Savan islets.

The Savan islets, $1\frac{1}{2}$ miles SSW. of Petit Mustique, form a group of small islets and rocks extending N. and S. over the space of 1 mile. The largest islet is about 600 yards long, 200 yards wide, 133 feet high, and being covered with grass has a bright green appearance when seen in the sun. Savan rock, 105 feet high, is remarkable from having whitish sides and somewhat the appearance of the Sail rock, which lies 11 miles farther to the southward, but from its being the southern of this group it cannot be mistaken for the isolated Sail rock. These islets and rocks are more or less skirted by reefs, and rise from a bank having from 4 to 10 fathoms water on it. Temporary anchorage will be found for small vessels NW. of the largest islet, but there is always a swell. The channel between this group and Petit Cannouan is $3\frac{1}{2}$ miles in breadth and clear of danger.

Petit Cannou-
an islet.

Petit Cannouan is 600 yards long, 200 yards wide, 222 feet high, steep-to, and clear of danger. Between it and Cannouan island, 4 miles to the SW., there are from 17 to 23 fathoms of water, and no danger.

Cannouan isl-
and.

Cannouan island is $3\frac{1}{4}$ miles long, with a very irregular outline; an indentation on its western side, called Charles-town bay, affords anchorage in 17 fathoms of water. The

island is almost everywhere bordered by reefs which extend off shore $\frac{1}{2}$ a mile on the S. and SE. sides. The northern part of the island is 853 feet high, and the NW. and SW. points are bold.

About $\frac{2}{3}$ of a mile WNW. of the NW. point of the island is a small bank on which the least water yet found is $6\frac{1}{2}$ fathoms.

The next group to the southward of Cannouan island consists of Mayero island, the Catholic islet and rocks, and Tobago cays and reefs. Mayero island, 374 feet high, is the largest, about $1\frac{1}{2}$ miles in length NNE. and SSW., and nearly a mile in extreme breadth. It contains about 260 inhabitants, who live by fishing and raising a few vegetables. Catholic islet and rocks are about 1 mile NW. of Mayero island; the islet is 186 feet, and the rocks at about $\frac{1}{4}$ of a mile to the SW. of it 77 feet high; the passage between them has 6 fathoms water, and may be taken with a fair wind in cases of necessity.

Mayero island.

In passing through the channel between Cannouan and the Mayero group, a vessel should pass to the northward of the Channel rock, 8 feet high, and in mid-channel, to avoid a shoal awash lying $\frac{1}{2}$ a mile SW. of it.

Four hundred yards NW. of the North Catholic rocks is a shoal, with $3\frac{1}{2}$ fathoms water on it, which must be avoided by vessels of large draught. A rock, 8 feet above water, and a small sand-cay, called the Dry Shingle, are connected to the islet on the E. side, at the distance of $\frac{1}{4}$ of a mile, by a bank which encircles it. Between Mayero island and the Dry Shingle, at about $\frac{1}{2}$ a mile NW. of it, is a good channel, with 5 fathoms water, for vessels from the northward for Mayero anchorage.

Anchorage.

Good anchorage in 6 or 7 fathoms water may be had on a bank extending about $\frac{3}{4}$ of a mile westward from Mayero island. The best and most roomy berth for leaving, with any wind, is near the edge of the bank, with the middle of the island bearing ENE., but, as the trade-wind is almost always between NE. and SE., a vessel may anchor much closer in out of the swell, taking care, however, to avoid a 3-foot shoal at 300 yards off the middle point of the island. The NW. point of Cannouan island well open of the NW.

point of Mayero, leads to the westward of the shoal; the two points in line lead on it.

In working for this anchorage keep on the parallel of Mayero, and do not open the channel between it and Union island unless the tide is setting to the northward.

On the E. side of Mayero island is a secure anchorage for small vessels, in from 6 to 9 fathoms water, under cover of the extensive reefs which surround this side of the island. The passage in is from the southward between the reefs on the E. and those skirting the shore of the island.

Tobago cays. At $1\frac{1}{4}$ miles eastward of Mayero island are four small islets, called Tobago cays. They extend over a space of about $\frac{3}{4}$ of a mile. Three of them are nearly in line N. and S., the two northernmost being the largest, and the middle one 150 feet high. The fourth islet is E. of the middle one. They are within a semicircular reef, just awash, named the Horseshoe reef. Horseshoe, the extremes of which are nearly $2\frac{1}{2}$ miles N. and S. of each other. There are two small sand-banks, about 2 feet above water, rising from the reefs at about $\frac{1}{3}$ of a mile SW. and SE. of the islets. The space between these cays and Mayero island is also filled with reefs, with narrow channels between them.

Good anchorage for small vessels in smooth water will be found under the lee of the cays, and between them and the Horseshoe reef, the latter forming a perfect breakwater. The route to the anchorage is from the northward, between Baline reef, at the NW. end of the Horseshoe, and Mayero island, borrowing on the latter to avoid a rock, with 6 feet water on it, lying SSW. 500 yards from the Baline reef. Small vessels may pass between Baline reef and the NW. end of the Horseshoe. A vessel may leave the anchorage by the channels to the southward, but a sailing-vessel cannot well get to it by them.

World's End reef. The most eastern danger belonging to the group of the Tobago cays and reefs is the World's End reef, which lies in an ESE. direction, and its eastern extreme distant $2\frac{1}{2}$ miles from the highest of the islets. It is $1\frac{1}{3}$ miles in length NW. and SE., about $\frac{3}{4}$ of a mile in breadth, and dangerous for sailing-vessels to be near in light winds, as the current sets strong over it. It has probably received its name from the fishermen having a long pull to reach it from the cays.

Close to the westward of World's End is Egg reef, separated by a narrow passage, and westward of the latter is Sandy cay, with a tree on it, encompassed by a reef above water, with channels on either side of it. The cay is 6 feet high and the tree 20 feet. These channels are narrow, deep, and may be taken in case of necessity. There is anchorage sheltered from the N. under the lee of Egg reef. Vessels should, however, avoid the vicinity of the whole of these reefs eastward of Tobago cays, as the tides are strong.

Egg reef and
Sandy cay.

Sail rock is a small islet or rock 203 feet high, rising from the southeast end of a small bank with 9 fathoms water over it, immediately within the 20-fathoms line of soundings. It is $3\frac{3}{4}$ miles eastward of the World's End reef, clear of danger, and bottom will be found on the edge of the great bank at the distance of 5 miles eastward.

Sail rock.

Union island, 1,010 feet high, is 3 miles long east and west and 2 miles wide. It lies 2 miles SW. of Mayero islands, and is the southernmost of those islands attached to the government of St. Vincent.

Union island.

The population in 1861 was 477.

The island is more or less skirted by reefs which connect to it Frigate islet, distant about $\frac{2}{3}$ of a mile on the south, and Red islet, 140 feet high, close to it on the east. About $\frac{1}{3}$ of a mile from its north side is a small sand-cay.

Chatham bay, on the west side of the island, affords fair anchorage for large vessels in 17 fathoms water, sand; but care should be taken not to go far into the bay, as there is a small shoal with 6 feet water on it at about $\frac{1}{4}$ of a mile from the shore, and a little inside the depth of 10 fathoms. Small vessels may anchor farther in on the north side of the bay. There are no dangers in entering the bay, which should be from the northward on the port tack. Give the northwest point of the island a berth of about 300 yards and pass close to a remarkable small islet, 52 feet high, at the north point of the bay, and when abreast it, with good way on, shorten sail and the vessel will shoot into the anchorage.

Chatham bay.

Temporary anchorage may be had to the southwest of Frigate islet in 8 fathoms water, if wishing to communicate with the villages on the southeast side of the island. Small vessels may go close to Frigate islet into 2 or 3 fathoms.

Clifton cove, at the east end of the island, is a secure smooth anchorage for small vessels, close to the northeast of a large house. The channel into it is close to the reef which protects the anchorage.

In Chatham bay fish can be procured with the seine in great abundance. Fire-wood is plentiful, but no water. The inhabitants are entirely dependent on what is collected in tanks during the rainy season.

Prune island. Prune island, about $\frac{1}{2}$ a mile in length and 164 feet high, lies 1 mile east of Union island. Nearly midway between them, or, rather, more than $\frac{1}{2}$ a mile west of the southwest end of Prune island, is a shoal nearly awash, with channels of 4 fathoms water on either side of it that may be taken by small vessels, but not recommended for general use.

Prune island is nearly surrounded by reefs, and on the north side they extend off nearly $\frac{1}{2}$ a mile. The navigable channel between the northwest end of the reefs and those extending from Union island is more than $\frac{1}{4}$ of a mile wide, with from 4 to 16 fathoms water. The route through from the northward is in mid-channel, but to the westward of the shoal, nearly awash, which lies west of the southwest end of Prune island.

Carriacou isl. and. Carriacou island, the largest of the Grenadines, lies $3\frac{1}{2}$ miles S. of Union island. It is $6\frac{2}{3}$ miles long and $2\frac{1}{3}$ miles wide, its highest part being 980 feet above the sea.

The eastern and southern sides are more or less bordered by reefs above water, which protect shallow anchorages inside them. The western side of the island is clearer and the water deeper, and there are two good anchorages for large vessels.

Wood is plentiful at Carriacou, but water is scarcely to be had, as there are no streams, and the inhabitants depend on rain for their supply.

Tyrrel bay. Tyrrel bay, called also Southwest or Great Carénage bay, at the W. end of the island, is an indentation formed by two points, one projecting to the NW. and the other to the SW. The inner part of the bay is circular and more than $\frac{1}{2}$ a mile in diameter. Large vessels may anchor in the northern and outer part of the bay, in from 15 to 5 fathoms water, sandy bottom, at about 400 yards from the shore; small vessels anchor in the inner part in from 5 to 2 fathoms. A

reef extends to the northward from the S. side of the bay for nearly 400 yards, and a shoal with $1\frac{1}{2}$ fathoms water on it, lies in the northern part, both within the line of anchorage for large vessels. Small vessels can pass between and above them almost up to the beach.

In the northern part of this bay, inside the low land, is a lagoon nearly half a mile in length E. and W., with from 4 to 26 feet water in it. The entrance to it, called the Carénage, is through a lane of deep water northward of the $1\frac{1}{2}$ fathom shoal in the N. part of the bay.

The W. point of Carriacou is foul for nearly 200 yards; $\frac{2}{3}$ of a mile off this point are the Sister rocks, 73 feet high, with a shoal extending ESE. for nearly a cable.

From Cistern point, projecting a little northward from the W. point of the island, the shore curves to the eastward and northward, forming Hillsborough bay, on the shore of which stands the little village of that name, and off it is the principal anchorage in Carriacou. At nearly $\frac{1}{2}$ a mile northward of Cistern point is Mabouya island, 135 feet high, and about the same distance to the eastward a low sandy islet with trees 30 feet high. At 1 mile NE. $\frac{3}{4}$ E. from the E. end of Sandy islet, and the same distance from the village, is the small islet of Jack-a-Dan, 33 feet high. A shoal with 4 feet water on it, lies between Jack-a-Dan and Craigston point E. of it, rather nearer the point than the islet, leaving a narrow channel carrying 7 fathoms water between Jack-a-Dan and the shoal. The passage between the shoal and the shore has 16 feet water in it.

A bank $1\frac{1}{2}$ miles in extent E. and W., with 5 to 7 fathoms water on it, lies 1 mile NW. of the N. part of the island, where vessels may anchor if necessary.

The N. point of Carriacou is clear, and may be passed at a distance of 400 yards. Approaching the anchorage in Hillsborough bay, a vessel may pass close to Jack-a-Dan on its W. side, and anchor in 14 fathoms water, sand and coral, with the isle bearing N. by W., distant 600 yards, and Sandy isle on with the Sister rocks. If necessary a vessel may anchor farther to the eastward, but not in less than 7 fathoms, as from this depth the water suddenly shoals to 2 fathoms, and the wind sometimes comes from the NW., causing a swell. Small vessels can go in almost

to the beach. The landing is exceedingly good, except when interrupted by the NW. swell. Anchorage for large ships may also be taken in 17 fathoms, with Jack-a-Dan bearing SE., distant 1 mile.

Watering and
Grand bays.

Watering and Grand bays, on the E. side of Carriacou, are protected by reefs, which are uncovered and skirt the whole of this side of the island at from one-third to a mile distant. The northern is called Limlair or Watering bay, the southern, Grand bay, off two estates of the same name, and they afford anchorage for small vessels of 9-feet draught. There are three channels for entering, but that between the reefs at the N. end northward of the dry sand-bank is the safest. The two southern channels, although deep breaks in the reef, are difficult to enter without local knowledge.

Little Marti-
nique.

Little Martinique, 746 feet high, lies nearly 2 miles eastward of the N. point of Carriacou, and $\frac{1}{3}$ of a mile N. of it is Little St. Vincent, 275 feet high. Off the SW. side of Little Martinique are the islets Little Tobago and Fota, the former 200 and the latter 80 feet high. On the NW. side of Little St. Vincent are two sand-banks 3 feet above water, lying respectively at a long half-mile and mile distance; from the easternmost a reef uncovered sweeps round the whole eastern side of the islands. At 400 yards SSW. $\frac{3}{4}$ W. from Little Tobago is a rock, with $1\frac{1}{2}$ fathoms water on it, and S. by W. $\frac{3}{4}$ of a mile from the western sand-bank are some shoal patches with 2 fathoms over them.

The channel between the Carriacou coast reefs and the islet of Little Tobago is 1,400 yards wide; in using it from the SE., keep $\frac{1}{3}$ the breadth of the channel from the edge of the reef, and when Fota opens of the NW. part of Little Tobago a vessel will be to the westward of the $1\frac{1}{2}$ fathoms rock. Between the rock and the reef there are from 6 to 10 fathoms water, but the tides in this channel are very strong, and it is not recommended. Fota channel, or that between Little Tobago and Fota, although narrow, is better than the former. A small reef above water extends rather more than $\frac{1}{4}$ of a cable N. from Little Tobago.

Between Fota and Little Martinique is a passage carrying $3\frac{1}{2}$ fathoms water, but it is not so good as the Fota channel.

As the tide sets fully 3 knots through the above channels,

it is necessary in working through from the NW. that the tide should be setting to the SE.; and in standing to the southward do not approach too near the Carriacou reefs, as the sea runs heavily on them.

At about $\frac{1}{2}$ a mile off the NW. side of Little Martinique, protected by Petit St. Vincent, the sand-banks, and reef surrounding these islands, there is most excellent anchorage in from 8 to 12 fathoms water, taking care to avoid the 2-fathom shoals S. by W. $\frac{3}{4}$ of a mile from the west sand-bank.

Large and Frigate islets are the largest of a number of ^{Large and Frigate islets.} islets and rocks, which, with Saline, White, Mushroom, Rose, and the Bonaparte, form a group at the S. end of Carriacou island. Between the Bonaparte rocks at the S. extreme of the group there is a narrow channel 10 fathoms deep, but a rock almost dry lies a little to the northward of the fairway, which renders it unfit to pass through. In the channel between Large islet and the Bonaparte rocks, southward of it, is a shoal stretching to the northward from the latter, and one with 3 fathoms water on it at $\frac{1}{2}$ a mile to the NW. of the rocks, and nearly the same distance SW. of the W. end of Large islet. The tide here runs with great strength, which renders it dangerous to use this channel, or to approach the rocks on the eastern side, unless in cases of extreme necessity. A rock 1 foot out of water lies 250 yards westward of Large islet.

Frigate channel, between Large and Frigate islets, is ^{Frigate channel.} narrow but clear of danger, and may be used by passing to the southward of the Rose rock, 32 feet high. There is also a channel carrying 5 fathoms water between the Rose and Frigate island.

The channel between Frigate and Saline islets, N. of it, is 1,400 yards wide, carries 18 fathoms water, and may be used from E. to W. by any sized ship. A rock 1 foot above water lies NW. 400 yards from the NW. point of Frigate islet. There is also a narrow channel with six fathoms water in it northward of Saline island, between it and Cassada rocks (20 feet high) and White islet. Also a channel 8 to 10 fathoms deep on the N. side of Cassada rocks and White islet and the reef adjoining them. In using this latter channel pass about $\frac{1}{2}$ a mile westward of White islet and

southward of the Great Mushroom. The latter may be passed close to on the S. side.

There is a narrow passage to the northward between the Great and Little Mushroom, but rocks above water lie off the SW. point of Carriacou, at the distance of 300 yards. The above channels can be taken only from E. to W. with the usual trade-winds, except by steamers. Small vessels having local knowledge, with the assistance of the tide, may work through them.

Anchorage for small vessels in 5 fathoms water will be found in the NW. bay of Large islet, 200 yards from the shore. Also, on the NW. side of Frigate islet in 5 fathoms. Between Saline islet and Cassada rocks and reef there is good shelter for small vessels, taking care not to be set to leeward on White islet.

De Caille and
Ronde islets.

At rather more than $1\frac{1}{2}$ miles to the northward of the London Bridge islets or rocks off the NW. end of Grenada is De Caille islet, 240 feet high, and close to the N. of it Ronde islet, 520 feet high. There is a narrow channel between them having 3 fathoms of water, but which breaks during strong winds. There are passages between the Sister rocks to the westward and also between them and Ronde islet. The Sisters are two groups of islets or rocks, 160 and 85 feet high, at about a half and nearly a mile, respectively, W. of the SW. end of Ronde islet.

Between Ronde and Diamond islets, or Kick'em Jenny, 668 feet high, to the N. of it, is a passage less than $\frac{1}{2}$ a mile wide, carrying 7 fathoms the least water. In the centre of the channel there is a deep hole with 39 fathoms water in it. The tide runs strong through this channel. Les Tantes, 250 feet high, lies $1\frac{1}{4}$ miles eastward of the N. part of Ronde islet, free from hidden danger, and may be passed close to on either side. The channel between them and Ronde islet is deep and clear, but, the tide being strong, it is not recommended.

Anchorage, with the usual trade-wind, for small vessels in convenient depths will be found under the lee of De Caille islet; in the S. and NW. bays of Ronde islet; and on the W. side of Les Tantes.

Tides and currents.

The strength, duration, and general direction of the tides among the Grenadines are very much influenced by local

causes; but generally in the course of twenty-four hours there are two tides each way. It is generally high water at full and change at 3^h, the tide seldom rising and falling as much as 1 foot.

The flood or tide setting to the westward is aided and accelerated by the westerly equatorial current, and in proportion as this takes place the ebb-stream to the eastward is retarded or overcome.

The direction of the tides is governed to a great extent by the inclination of the trade-winds, which, although they do not vary much from E., still greatly affect the tide.

The flood-tide is of longer duration usually than the ebb, and in mid-channel will sometimes, aided by the current, run all day, while close to the islands the ebb-tide may be found running to the eastward.

When the ebb-tide runs against a strong trade-wind, a heavy, confused sea is raised.

The average strength of the tides in the channels is about 2 miles, and in some places 3 miles, an hour.

Sometimes, however, aided by the current, the flood-tide rushes through the passages at the rate of 4 knots.

GRENADA.

The island of Grenada was discovered by Columbus in 1498, was first settled by the French in 1650, and has been since 1783 an English colony.

It is about 18 miles long NNE. and SSW. and 8 miles wide, with a population in 1871 of 37,795.

The island is of volcanic origin, and is traversed by a chain of mountains of irregular height, mount St. Catherine, about 6 miles S. of the N. end of the island, 2,749 feet high, being the highest. Mount Sinai and Southeast mountain, back of the town of St. George, are between 2,300 and 2,400 feet high.

The island has the reputation of being a healthier residence than most of the other West India islands, but it is probable that this belief is without foundation. Malarial and bilious fevers are frequently prevalent, and deaths from yellow fever often occur.

The frequent showers, alternating with bright sunshine, tend without doubt to produce sickness.

The island is surrounded by reefs and banks, which make off from the points, limiting the harbors, thus making the pilotage almost everywhere quite intricate, and necessitating great caution when approaching the shores.

The trade-wind blows almost without interruption from between NE. and SE., sometimes very fresh indeed; but hurricanes are of very rare occurrence.

The general set of the current in the vicinity of Grenada is to the westward, and in approaching its shores this current must be carefully allowed for.

Tides and currents.

Off the bank to the southward of Grenada the current generally sets 2 knots an hour to the westward. On the bank it is checked by the ebb-tide, which sets round the SW. point of the island and along the S. shore, but which is only felt for 2 or 3 hours, while the current and flood-tide run for 8 or 9 hours to the westward. Off Grand Bacolet, on the SE. side of the island, where the ebb scarcely reaches, the current united to the flood-stream runs down strong for 6 hours and weak for 2 hours, while the ebb-tide overcomes the current only for 4 hours.

During the wet season, from June to the fall of the year, the ebb is often entirely overcome by the current, probably caused by the water discharged from the South American rivers. Therefore a sailing-vessel from St. George to Grenville bay should go round the N. end of the island, as it is scarcely possible to work past Grand Bacolet bay. Scarcely any tide or current is felt under the lee of Grenada, and, if any, it is quite uncertain, except close along shore, where it is also weak. The water in the southern harbors is unaffected by the tide.

The following rule is used by the island seamen for determining the time of the turn of the stream: From the time of the moon's rising until her superior transit or passing the meridian the stream sets to the eastward; from the superior transit until she sets it runs westward; then from the time of the moon's setting until her inferior transit the stream runs to the eastward again; from the inferior transit until she rises it runs to the westward. The ebb-stream, however, has been found to set eastward or to windward later by $1\frac{1}{2}$ or 2 hours, although at particular points close

in shore the above rule, which applies also to the Grenadines, is nearly correct.

In approaching Grenada from the NE. the best channel is that between De Caille islet on the N. and the London Bridge rocks on the S. London Bridge rocks.

These rocks form a small cluster, one of them being 75 feet high, with a hole through it, and having two smaller ones near it. There is a rock just uncovered lying 400 yards SW. of it. A bank with 6 to 10 fathoms of water surrounds these islets, and a small 8-fathom bank lies 1 mile E. $\frac{3}{4}$ N. from them.

Another channel of approach lies between the London Bridge rocks and Levera island, lying close off the NE. point of Grenada and 343 feet high. In taking this channel steer midway between Levera and London bridge, where a depth of 17 fathoms will be carried.

After passing through either of these channels, if bound to St. George, follow the western shore of the island at $\frac{1}{2}$ a mile distance, there being no danger to apprehend till arriving abreast of the entrance to St. George harbor.

Between David point, the northern extremity of the island, and St. George harbor, the following bays abreast of the villages of the same name afford temporary anchorage for coasters, viz :

Du Quesne, Cray-fish, St. Marks, or Grand Pauvre, Goyave, or Charlottetown, and Grand Mal bays. There is also anchorage on the 5-fathom bank 2 miles N. of Grand Mal bay. All these bays are exposed to the northward and westward and are very subject to strong gusts off the land.

The southern point of Grand Mal bay is St. Eloy point, 420 feet high, with a reef extending 200 yards off it. One mile to the southward of St. Eloy point is the entrance to St. George harbor.

St. George, the principal town in the island, stands on a point of land ranging from 115 to 180 feet high, which forms the harbor called the Carénage, in a bay of the same name, between St. Eloy point on the N. and Long or Goat point $2\frac{1}{2}$ miles to the southward of it. The 100-fathom line of soundings W. of Fort George point is only $1\frac{1}{4}$ miles from it, and the bank off the town is intersected by veins of deep water. It affords, however, excellent anchoring-ground, St. George harbor.

but it is necessary to guard against the inconvenience of anchoring in the deep-water holes.

A ground-swell sets in here from the month of November to March, sometimes causing a swell in the Carénage; on the 28th and 29th November, 1858, the water was forced into the market-square, and some of the streets filled with sand. This ground-swell takes place in the same month throughout all the islands. The locality of the harbor or Carénage may be easily known by the extensive fortified heights immediately above it, which reach 750 feet above the sea. The N. point of entrance, on which is fort St. George, with the town N. of it, is a bold, bluff headland, while on the hill on the S. side of entrance is the harbor-master's house and flag-staff.

The length of the harbor is about 900 yards, and its breadth varies, but from the western shore to the shoals on the E. side it is less than 350 yards across, which diminishes at the head to 200 yards. On its southeast side is a large indentation with shallow water, the southern part of which, separated from the northern by a point of land, is somewhat circular, about 500 yards in diameter, and in the centre from 20 to 25 feet deep; this latter part is called the Lagoon. Although small, the harbor is secure, and is entered by vessels of the largest draught, through a deep channel carrying from 23 to 11 fathoms water to the anchorage. The harbor-master acts as pilot. The usual anchorage for vessels of war is in the bay.

A bank about $\frac{1}{3}$ of a mile wide, with an average depth of 4 fathoms, extends westward about $\frac{3}{4}$ of a mile from the southern point of the entrance to the harbor. On this bank there are some shoal patches with from 19 to 20 feet of water on them. The Annas shoal, the northernmost of these, lies W. $\frac{1}{2}$ S. $\frac{1}{2}$ a mile from Fort George point, and is only a narrow lump, less than 100 yards long NE. and SW.

The Three-Fathom banks are some small heads, also with 19 to 20 feet of water on them, from 200 to 400 yards S. of the Annas shoal.

In approaching the entrance to St. George and having mount Moritz, the first high hill from Molinière point, open of St. Eloy point, bring the extreme of Fort George point on with the S. end of the military hospital, a large building on the

first ridge inland E. $\frac{1}{3}$ S. This mark will lead rather less than 1 cable to the northward of the NW. 20-foot patch of the Annas shoal; be careful, therefore, not to open any part of the hospital to the southward of the point. When the square chapel-tower with four turrets is in line with the spire of the church NE. by E. $\frac{2}{3}$ E., haul up quickly for the S. end of the sand in Martins bay until the end of Martins wharf (at the S. point of entrance to the harbor) comes on with the extreme of the Ballast cliff, a rocky point 200 yards beyond it; keep on this line for about 200 yards or until the buildings in the outer bay are shut in with Fort George point; the course will then be a curve to the Carénage.

Sailing-vessels from the southward whose draught will admit of crossing the Annas shoal should make a tack into Grand Anse bay, to take advantage of the flaws of wind which occasionally come from the SE., and which enable them to lay well up for the Carénage.

Anchor about 200 yards off the coal-wharf, or in the middle of the Carénage. If intending to make any stay, it will be requisite to moor open hawse to the SW., as there is but little room to swing at single anchor. In leaving the harbor, it will be necessary to place the vessel's head in the right direction before starting, and in a vessel of 26 feet draught the elbows of the channel should be buoyed.

Vessels of large draught and men-of-war generally anchor outside of Fort George point. A good berth will be found $\frac{1}{2}$ a mile off shore in 7 fathoms of water, sandy bottom, with Fort George flag-staff bearing E. $\frac{1}{2}$ S., and Boismaurice point N. $\frac{1}{2}$ W.

A *fixed white* light is shown from Fort George flag-staff when the mail-steamer is expected. It can be seen at a distance of 3 or 4 miles.

It is high water, full and change, in St. George harbor at 11^h 40^m. Spring-tides rise 1 $\frac{1}{2}$ feet, and neaps 8 inches.

Fresh provisions and water can be obtained in abundance at Grenada. Coal can also be generally obtained in moderate quantity.

St. George is connected by the submarine cable of the W. I. and Panama Telegraph Company with St. Vincent on the N. and Trinidad on the S.

Light.

Tides.

Supplies

Two miles SW. of the entrance to St. George harbor is Long or Goat point, to the northward of which is an indentation in the coast called Grand Anse bay.

Long Point
shoal.

Nine hundred yards W. of Long point is Long Point shoal, having only 2 feet of water on it, and on which the sea generally breaks. In approaching St. George harbor from the southward, the eastern extremity of Fort George point, kept on with the government house, a large red brick building on the first ridge bearing NE. by E., will lead clear of the shoal.

There is a narrow channel between Long point and the shoal, but it should only be used in case of necessity.

There is good anchorage in 5 or 6 fathoms of water on the bank extending to the SW. from Long Point shoal, at rather more than a mile to the NE. of Saline point, and a long half-mile from the shore. This anchorage is the resort of the American whaling-vessels in bad weather, or for the purpose of boiling oil during the season from February to May. There is a hole 10 to 13 fathoms deep nearer the shore, about $\frac{3}{4}$ of a mile in extent.

Saline point.

Saline point, so called from a salt-pond near it, is bold, perpendicular, and 100 feet high. It should not be approached in a large ship nearer than 1 mile, to avoid the Seringapatam shoal and the bank joining Saline point and Glover island.

Seringapatam
shoal.

Seringapatam shoal, so called from the English frigate of that name having struck there in 1839, lies SW. $\frac{1}{4}$ W. 700 yards from Saline point. It is only $\frac{1}{6}$ of a mile in extent, has 21 feet of water on it, and disturbs the water very considerably, although it does not break. Vessels drawing 16 feet may pass Saline point at 200 yards distance.

Eleven and a half miles W. by S. $\frac{3}{4}$ S. from Saline point there are some shallow patches, on one of which there are only 29 feet of water.

Glover island.

Glover island is small, and 41 feet high. It lies on the southern edge of a 3-fathom bank extending from the shore east of Saline point, from which it bears SE., distant $1\frac{1}{4}$ miles.

The Porpoises.

The Porpoises are a cluster of rocks about a cable in extent, 3 feet above water, steep-to, and lying SSE. $\frac{1}{4}$ E. five-eighths of a mile from Prickly point, E. by S. $1\frac{3}{4}$ miles from

the south end of Glover island, and rather more than $\frac{1}{8}$ of a mile within the 10-fathom line of soundings. At about a third of a mile E. by S. of them is a shoal spot with $3\frac{1}{2}$ fathoms water on it.

Prickly bay lies to the westward of Prickly point, the southern extremity of Grenada; it is easy of access, and affords good temporary anchorage for vessels of 18 feet draught. There is a shoal with $1\frac{1}{2}$ fathoms water on it at about a quarter of a mile from the head of the bay, not distinctly seen. To the westward are True Blue and Hardy bays, which may be used by vessels of 15 feet draught.

Prickly bay.

Mount Hardman bay, between Prickly point on the W. and Mount Hardman point on the W., affords good anchorage in 4 or 5 fathoms of water, but the channel is crooked. With smooth water the reefs on the sides of the channel can be seen, and the eye will then be the best guide.

Mount Hard-
man bay.

The entrance to Clarke's Court bay is formed by Caliveney and Hog islands, and the shoals and reefs extending from them. It is larger than Port Egmont, capable of holding a large number of vessels, and would present no difficulty in entering under steam were the shallows buoyed. The anchoring-ground is about a mile in length and 600 yards wide, in 7 and 8 fathoms water, muddy bottom. The passage is through a narrow vein of deep water, between the banks on either side with 2 to 4 fathoms on them. Here vessels may lie quite secure even in a hurricane. There are three shoals in the bay, one in the NE. and one in the SW., both nearly dry; and one with 6 feet of water over it, in the northern part.

Clarke's Court
bay.

Being to the eastward of Caliveney island, approach it with caution, and bring the two eastern points of Hog island in line bearing NNW. $\frac{5}{8}$ W., taking care not to go leeward of this mark. When the S. extreme of Caliveney island is in line with Fort Jedy point, haul up midway between the reefs, or close with the weather shore, and anchor in the bay where convenient, avoiding the shoal before mentioned.

There is good anchorage for small vessels between Hog island and the main in 4 fathoms water; the channel is narrow, but may be taken in fine weather.

Fort Jeudy point. Fort Jeudy point, 3 miles E. of Prickly point, is 70 feet high, and has a detached rock off it.

Port Egmont. Port Egmont, westward of Fort Jeudy point, is an inlet one mile in length and 250 yards wide, carrying 8 fathoms water to the upper part, where there is a narrow passage to an inner harbor, landlocked, 4 and $5\frac{1}{2}$ fathoms deep, with 21 feet water at the entrance; and where vessels may lie hidden from seaward. At the head of this harbor the French landed 3,000 troops in the year 1779.

There is secure anchorage for small vessels on the W. side of Adam islet, S. of Egmont point, which forms the W. side of entrance to the port, but it is difficult for a sailing-vessel to get to sea, the course out being SE.

Caliveney harbor. Caliveney harbor lies E. of the peninsula, of which Fort Jeudy point is the southern extremity. The entrance will be known by Westerhall point, trending to the eastward, with three hills upon it, and light-colored cliffs on the SE. side. The course in is NW., between the shallows on either side.

Bacaye harbor. Bacaye harbor, on the N. side of Westerhall peninsula, affords good anchorage for small vessels.

St. David's harbor, 2 miles NE. of Fort Jeudy point, affords anchorage for small vessels. To enter it, steer midway between St. David's point on the E. and the reef extending off Middle point on the western side. St. David's point is square, bluff, and foul for a short distance. Anchor with Middle point bearing W. in $5\frac{1}{2}$ fathoms of water.

From St. David's point to Grenville bay, 7 miles to the northward, the E. coast of Grenada is indented with numerous small bays, only frequented by coasters for the collection of produce. The bays are all more or less open to wind and sea.

Grenville bay. Grenville bay, $6\frac{1}{2}$ miles S. of the NE. point of the island, is very much obstructed by reefs, which, however, afford shelter to the anchorage. The bay lies between Telescope point on the N. and Marquis island on the S., and is entirely open to the eastward. The inner anchorage can only be approached by vessels drawing less than 12 feet. Vessels lie in the outer anchorage also, under the shelter of a reef, until lightened to that draught. There are no good marks for entering; the assistance of a pilot is therefore necessary.

The village of Grenville, on the shore of the bay, is the second place in importance in the island.

In coming in from seaward toward Grenville bay, it will be necessary to guard against being set to leeward by the current. Here it runs so strong to the SW. that a sailing-vessel missing the bay will have to go round the island and again come in from the NE. The stream striking Grenada on its eastern face turns along shore both to the NW. and SW.

The coast from Grenville bay runs nearly N. for 6 miles to Bedford point. It is an open, sandy shore, exposed to the whole force of the wind and sea. On the shallows off shore the sea breaks everywhere inside of the 5 fathom line.

Off this part of the coast are the Telescope islets, 65 feet high, and $\frac{3}{4}$ of a mile to the eastward of Telescope point; Conference islet, 62 feet high, and $1\frac{3}{4}$ miles farther N.; the Antony rock, 33 feet high, and $1\frac{1}{2}$ miles NNE. of Conference islet; and Bird island, 50 feet high, lying nearly $3\frac{1}{2}$ miles eastward from Bedford point, the NE. extremity of the island.

Sandy and Green islands are less than 1 mile eastward of Bedford point. The anchorages under their lee are safe and accessible, but, as the lee tide sets strong round Bedford point, and the trade-wind tends to increase it, there would be considerable delay in loading vessels at either of these anchorages. Sandy island is surrounded by a reef which extends southward about $\frac{1}{4}$ of a mile. The S. side of Green island is also foul a cable off.

Half a mile eastward of David point, the NW. extreme of Grenada, is Laurant point. Shallow water extends off about $\frac{1}{4}$ of a mile from both points. One mile SE. from the latter is the village of Sauteurs, or St. Patrick, in a bay of the same name. Some rocks extend to the NW. from the point forming the E. side of the bay, which shelters small boats only. The extremity of Laurant point is a high perpendicular cliff, called Morne des Sauteurs.

Irvin's bay, eastward of Sauteurs, is the principal anchorage on the N. side of Grenada, where about one-half of the annual crop of the island is shipped. Vessels generally moor on a 7-fathoms bank extending from the shore, with

open hawse to the NE. It is recommended to drop the outer anchor with the S. end of the island of Levera in line with the N. extreme of Grenada, and to place the starboard or inshore anchor to the southeastward, with about 70 fathoms of cable on the outer and 30 fathoms on the inner anchor. The ship will then be about 800 yards from the shore. This anchorage is exposed, and the wind occasionally blows hard from NNE. It is not, however, dangerous in the spring of the year, the holding-ground being good. Droghers and small vessels may take shelter in Levera bay, under the lee of the island of the same name.

BARBADOS.

This island is the easternmost of the Windward islands. The exact date of its discovery is unknown, but it was probably first seen by the Portuguese in about the year 1600, and taken possession of by the English in 1605, in whose hands it has since remained. In form it is an irregular triangle or pear-shaped, with the pointed end to the N; its length in a NNW. and SSE. direction is about 18 miles, and the breadth between the extreme E. point and Bridgetown 12 miles, the whole island containing an area of about 166 square miles.

Notwithstanding its small extent, Barbados presents considerable variety of surface, as valley, hill, table-land, &c. A deep valley, running almost E. from Bridgetown, divides the island into two parts, of which the northern is by much the larger. Near the centre of the latter, mount Hillaby, the highest part of the island, rises 1,104 feet above the sea. The general appearance of the island is low and level.

From the W. coast the land rises in successive distinct terraces, interrupted by numerous and deep ravines, to the central ridge; from which, and principally from mount Hillaby, hills of a conical form range in a NE. direction toward the sea; this high land is called Scotland; the hills are rugged and worn by the heavy rains and torrents which pour down their sides. Between the E. and S. points the ground is nearly level, sloping gently to the sea-cliffs; while from the E. to the N. point the outline is broken and irregular. In clear weather the highest hills may be seen at a distance of about 40 miles.

The N., W., and S. parts of the island consist of rocks of coralline limestone, with beds of calcareous marl, containing numerous recent shells of various species; the E. is composed of strata of siliceous sandstone, intermixed with ferruginous matter, calcareous sandstone passing into siliceous limestone, different kinds of clay, selenite, earthy marls, frequently containing minute fragments of pumice, strata of volcanic ashes, seams of bitumen, and springs of petroleum.

The rivers are small except during the rainy season, when they are much increased; the average yearly rain-fall amounts to 58 inches, and the greatest known occurred in October, 1867, when 6 inches fell in 4 hours. There are several chalybeate springs, containing chiefly iron, carbonic acid, and fixed alkali, in different proportions. Barbados is considered to be one of the healthiest islands in the West Indies, and the climate, though warm, is very salubrious. In the forenoon, the mean temperature during the year is about 80°, and in the afternoon 82°; the minimum being 75°, and the maximum 87°.

The island was devastated by a hurricane in 1675, and by another in October 1780; the latter left hardly a building standing, and killed many of the inhabitants, the loss of human life being estimated at between 3,000 and 4,000 souls, and of property to more than \$5,000,000. Between that and the last great hurricane of 1831 there were several others, the severest of which was that of October, 1819, but these were less disastrous. The hurricane which desolated the island in 1831 exceeded in violence any of the former. The number of persons who lost their lives is said to have amounted to upward of 2,000, and by some to more than 5,000, and the loss of property to nearly \$8,000,000.

The island is divided into 11 parishes or districts. Bridgetown, the capital, is situated mainly N. of a rivulet in Carlisle bay, at the SW. end of the island, but it extends along the shores of the bay for nearly two miles. Though irregularly built, it contains several handsome houses, and a large square adorned with a good statue of Nelson. It has a cathedral, which is spacious and plain, its tower scarcely rising above the roof, for fear of hurricanes, for which reason also the churches are without steeples. Besides the

churches there are several chapels and 100 schools. A college or grammar school, founded by General Codrington, formerly governor, is pleasantly situated on the eastern side of the island. At the southern extremity of the town is St. Ann castle, with its spacious barracks and extensive parade-ground. The town is abundantly supplied with excellent water, led in from Newcastle on the E. coast, and an effective system of hydrants is maintained.

The chief staple articles produced in Barbados are sugar, arrowroot, aloes, and cotton. The population in 1871 was 162,042, of which 16,560 were white, and the remainder colored and black.

Bridgetown has an extensive commerce with the neighboring islands, large amounts of merchandise imported from the United States and Europe being reshipped here for consumption in Tobago, Grenada, St. Lucia, and St. Vincent. Numerous vessels also, seeking employment, call here for charters, and are engaged to load at other islands.

Northeast
coast.

From Kittridge point, the E. end of Barbados, the coast, forming a slight indentation, trends about NW. to the N. point, and is formed of rocky cliffs varying from 50 to 800 feet in height, intersected by sandy bays and beaches, which are skirted by a coral reef, always breaking, and which encircles almost the whole island; in this space the reef extends from about $\frac{1}{4}$ to $\frac{1}{2}$ a mile from the shore. Conset's bay affords shelter for boats, but is difficult of access.

The E. end of the island is about 50 or 60 feet high, and continues flat for about 2 miles inland, when it becomes more elevated; and at 3 miles W. of the E. point is Moncrieffe Hill signal-post, which stands 521 feet above the level of the sea. At 3 or 4 miles to the NW. the island begins to rise in rugged hills abruptly from the shore, and at 8 miles from the N. end, and about midway between the eastern and western sides of the island is mount Hillaby, the highest peak of the island. The high ridge terminates at the coast, about 4 miles from the N. point of the island, in a remarkable hill, called Pico Teneriffe, 269 feet high, which at a distance appears almost detached from the shore.

The coast from Pico Teneriffe is composed entirely of low rugged cliffs from 40 to 60 feet in height, and sweeps round

the N. end of the island, in a semicircle, to Harrison point on the opposite shore, and between these two points the island is about $4\frac{1}{2}$ miles broad. For the first mile from the N. point inland the ground is level and open, and thence commences to rise gradually to the southward. The reef in this space borders the shore at the distance of about $\frac{1}{2}$ a mile.

From Harrison point the coast trends nearly S. for about 13 miles to Pelican island, at the N. end of Carlisle bay; the shore is generally low, but a short distance inland it begins to rise in successive distinct terraces, interrupted by ravines toward the central ridge. These terraces may be traced all the way from Bridgetown to near Harrison point, where they terminate in a bold bluff. The shore is slightly indented with sand-beaches, the points being fringed by coral reefs, which off Harrison point extend nearly $\frac{1}{2}$ a mile and are dangerous.

West coast.

Speights town, the most considerable place next to Bridgetown, is situated about $3\frac{1}{2}$ miles to the southward of Harrison point, and off it there is anchorage, but the roadstead is not frequented, as it is found more convenient to ship the produce in droghers, or small craft, and convey it to the vessels in Carlisle bay.

James or Hole town, a small village about 4 miles farther to the southward, has also anchorage off it, and the roadstead is used for the same purpose as that of Speights town.

Pelican shoals lie about 4 miles southward of Hole town, $1\frac{1}{2}$ miles from Pelican island, and $\frac{1}{2}$ a mile off shore. They are nearly dry, with 5 fathoms water about 200 yards outside them. There are also detached coral patches about 1,200 yards off Spring Garden point, the shoalest of which has 4 fathoms water on it. Pelican island is a small, low, rocky islet with a quarantine building, painted black, on it, lying about 300 yards from the shore, within the reef, and with it forms the N. end of Carlisle bay. St. Anne clock-tower, in line with gateway, SE. by E., leads 500 yards outside the foul ground of this reef.

Pelican shoals.

Carlisle bay, the principal anchorage, along the shores of which is situated Bridgetown, the capital of Barbados, is an indentation of about $\frac{1}{2}$ a mile, and formed between Peli-

Carlisle bay.

can island and Needham point, which bear from each other about NNW. $\frac{3}{4}$ W. and SSE. $\frac{3}{4}$ E., distant $1\frac{1}{2}$ miles. From Needham point, which may be easily known by the forts and signal-staff at its extremity, a shallow rocky spit extends 600 yards to the westward, and a *red* buoy with staff and vane is moored on it in 5 fathoms water, with the garrison clock in line with the SW. angle of Beckwith fort bearing E. $\frac{1}{2}$ N., and the outer house on Pelican island NNW.; but as the buoy occasionally breaks adrift vessels approaching from the eastward should not cross the spit until they have brought the northern extreme point in one with the E. end of Pelican island bearing N. by W. $\frac{3}{4}$ W., and when the flag-staff of fort Charles on the point is in one with St. Anne castle they can haul to the northeastward and anchor as convenient. In the bay, tides are weak and irregular.

The bottom is foul and uneven in many parts, but an anchor with a chain-cable is seldom lost. In the northern part of the bay there are two coral patches, having from 4 to 5 fathoms water on them, but they will be avoided by not standing farther in that direction than to bring the refinery chimneys (standing on the shore in the centre of the bay) E. $\frac{1}{4}$ S. The leading mark for the spit off Needham point leads also westward of the knolls, and the flag-staff of St. Ann castle in one with the NE. corner of the dock-yard store-houses (a white diamond on a black square has been painted on the centre of these store-houses, but it is not easily seen) SE. $\frac{1}{4}$ E. leads between them, and just outside the foul ground off the SW. side of Pelican island. Merchant-vessels anchor in the northern part of the bay; small vessels and coasters moor alongside the wharves of the Carénage, which has 14 feet at its entrance at low water. The mail-steamers have moorings in 7 fathoms, with the refinery chimneys in line E. by N. $\frac{1}{2}$ N. This buoy (*red*) is useful for men-of-war picking up their anchorage in the southern part of the bay, which is usually clear. For a large ship, the best berth is in 16 fathoms with gateway and clock-tower in line SE. by E., and Clapham mill open N. of Britton's mill E. $\frac{1}{4}$ N. Smaller vessels anchor inshore of this according to draught.

Supplies.

Coal and all other supplies can be purchased. Water is delivered on board from tanks at a very moderate cost. Port Castries, St Lucia, is, however, a better coaling-station.

A *fixed* light is exhibited at the southern part of fort Charles, on Needham point, at an elevation of 30 feet above the sea. The light shows *red* when bearing to the northward of E., and *white* when to the southward of E. The light is indifferent, but the white light may be seen in clear weather from 5 to 7 miles, and the red light 3 miles. Light.

The coast from Needham point runs in an E. by S. direction $4\frac{1}{2}$ miles to Oistin town, and from thence it bends gradually round to the SE. for $1\frac{1}{2}$ miles to the extreme S. point of Barbados, forming Oistin bay, in which there is anchorage for small vessels in from 5 to 10 fathoms water; clear ground will be found in about 6 fathoms, with Christ church N. by E. and Kendal point SE. by E. $\frac{1}{2}$ E. In hauling up for this anchorage, take care to give a good berth to the S. spit, which extends to the SW. nearly $\frac{3}{4}$ of a mile from S. point. The whole of this shore is flat and low, but at a short distance inland the ground rises somewhat in terraces, and $\frac{1}{2}$ a mile northward of Christ church attains the height of 180 feet. South west coast.

A light-house 90 feet high, and painted in alternate red and white bands, each being $7\frac{1}{2}$ feet wide, stands 200 yards inshore of South point, and its base is 55 feet above the sea. From it is shown a *red* light, 145 feet above the sea, which *revolves* once every *minute*; after an eclipse of 12 seconds it again appears, gradually increasing in 24 seconds to its greatest brilliancy, and then in 24 seconds more is eclipsed. From the light-house, Seawell point bears about NE. by E. $\frac{1}{2}$ E. and Needham point W. by N. $\frac{3}{4}$ N.; the light is thus only seen from a vessel when bearing from SW. by W. $\frac{1}{2}$ W., round by N. to E. by S. $\frac{3}{4}$ S., and is visible at the distance of 18 miles. Light.

From South point the coast trends about NE. 9 miles to Kitridge point, curving outward a little about midway. The shore is flat, and composed chiefly of bold rocky cliffs from 50 to 60 feet high; in some places, however, the cliffs have been undermined by the sea, and fallen in huge masses on the beach beneath. This is the most dangerous part of the island, coral reefs extending almost continuously at from 400 to 600 yards off shore, having 1 to 4 feet water on them, and generally breaking heavily for the whole distance. There is a boat-channel inside these shoalst Southeast coast.

Abreast New Fall cliff and 600 yards from the coast to the SW. extreme of the Cobbler reef, which extends at about the same distance off shore nearly as far as Long bay, having two gaps, in the ridge of $2\frac{1}{2}$ and $1\frac{3}{4}$ fathoms. Here the reef increases its distance from the coast to $1\frac{1}{10}$ miles off Palmetto bay, which is $\frac{3}{4}$ of a mile southward of Kitridge point. The Cobbler reef here is about $\frac{1}{2}$ a mile in width, with from 2 to 8 feet water over it, and breaks heavily even in the finest weather; inside the reef there are 3 and 4 fathoms, with smooth water. Eastward of the Cobbler reef, and nearly $1\frac{1}{2}$ miles from the coast, a remarkable coral ridge, with from 7 to 10 fathoms on it, curves and extends to the SW. at nearly an uniform distance off shore till abreast the South point. Between this and the inner reefs there are from 12 to 26 fathoms. To seaward of these reefs the water quickly deepens to the 100-fathom line, which will be found about 2 miles off shore. At spring-tides there are overfalls off the Cobbler and South point reefs.

Light.

A white light-house 97 feet high stands 300 yards within the cliff of Ragged point, in latitude $13^{\circ} 9' 55''$ N., and longitude $59^{\circ} 25' 35''$ W., from which is shown a *revolving white* light, giving flashes every *two minutes*, 213 feet above the sea, and in clear weather should be seen 21 miles.

It is said that this light can be seen 25 miles.

In approaching Barbados from the eastward the latitude of 13° N., which is that of South point, should be attained at a considerable distance to the eastward of the island.

In these latitudes, where the atmosphere is in general so clear and favorable, (except in the rainy season,) this may be readily accomplished by observing at day-dawn and evening twilight the meridian altitudes of stars N. and S. for latitude, and of others E. and W. for longitude. This is a means of ascertaining a ship's position which needs very little practice to obtain very accurate results, but it is very much neglected.

If South Point light has been made from the SE., care should be taken not to approach the shore within 3 miles, until it bears NE., when a course may be shaped for Needham point.

When approaching Barbados from the northward, keep if possible well to the eastward of the island, in order to pass

to windward of it, and having rounded the Cobbler reef at the distance of 3 miles, the coast may be skirted about 2 miles off shore. Should it be sighted in the night from the NE., the light on Ragged point will be the guide, remembering that to clear the Cobbler reef it must not be brought to bear northward of WNW. till the South point light is seen.

Should vessels coming from this direction get to leeward and be obliged to pass W. of the island, a berth of about 2 miles should be given to the reef off the NW. point, and the shore must be approached carefully. Soundings extend some short distance outside the reefs, 20 fathoms being found at about $\frac{1}{2}$ a mile; a depth of not less than 10 fathoms will clear them. Approaching Carlisle bay from the northward, do not haul round Pelican island until the clock-tower is in one with the gateway bearing SE. by E.

Making Barbados from the eastward toward night-fall, it should be borne in mind that the first land seen will be that near Moncrieffe, about 540 feet high, and not the South point of the island, which is more than 300 feet lower, (the upper ridge falling abruptly to the lower land;) so that vessels steering a careful course to pass the supposed South point at a safe distance have, from this mistake and the increased current on nearing the land, frequently run into danger; the light on Ragged point will now be the guide, as previously stated, for avoiding the Cobbler reef, where the 100-fathom line is only $\frac{2}{3}$ of a mile off shore.

At night, vessels bound to Carlisle bay from the southward should give the *revolving red* light on South point a berth of at least 2 or 3 miles, and after passing it may haul up about W. by N. $\frac{1}{2}$ N. for the bay, when the *red* light on Needham point will soon be seen. Keep the lead going in nearing the point, and on hauling up into the bay when the *white* light is seen, bear in mind that the rocky spit from Needham point is steep-to, the anchoring ground is full of holes, and frequently crowded with vessels.

In approaching the bay from the northward, when the light is seen bring it to bear eastward of SE. $\frac{1}{2}$ E., to clear the shoals off Pelican island.

When beating up to Barbados from the westward, endeavor to keep directly under its lee in order to avoid the

Current.

current, which generally sets strong to the westward. Sometimes, however, the current varies its direction to NW., and even as far as N., particularly between the island and Tobago, and its rate is chiefly governed by the strength of the wind; in the rainy season it is sometimes scarcely perceptible.

Winds and
weather.

January is generally dry at Barbados; the breeze sets in early, and it is altogether one of the finest and most healthy months of the year. February partakes of the same character. March and April are the driest months. May is also dry in the early part, but rain sets in toward the end. In June the breeze is light, the clouds are heavy, and thunder and lightning set in with frequent showers. July is most oppressive, the regular trade-wind is interrupted, and breezes frequently prevail from SW. and W.; rain descends in torrents. August and September are very similar, with calms and light airs from the southward. October, toward the middle, becomes drier, and the refreshing trade-wind sets in after thunder storms. November is still rainy, the winds variable, and not unfrequently from the SW. December has almost daily slight showers, but the month is generally cool, and the trade-wind steady.

TOBAGO.

The island of Tobago, the southeasternmost of the Caribbean islands, belongs to Great Britain, and was discovered by Columbus in 1496. It has been an English colony since 1793.

The island is $22\frac{1}{2}$ miles long NE. and SW. and $6\frac{1}{2}$ miles wide. Its shores are generally bold and steep-to.

A mountain-range of volcanic origin and of irregular height runs through a portion of the island, reaching an elevation of 1,900 feet in places.

Commencing at the NE. end of the island this range extends through two-thirds of its length, the southwestern portion terminating in broken plains and low land. The summits of the mountains are generally rounded. The population in 1871 was 17,054.

The northern end of Tobago terminates in a slightly rounded point, and close off it is a cluster of bold rocky islets, called the Melville or St. Giles rocks, which are steep-to.

The western one, called London Bridge, has an arch through it, open to the northward. The N. rock, called Marble island, is nearly white.

In the channel between Tobago and the St. Giles rocks and about equidistant from them is a dangerous rock just awash. There is a deep but narrow channel on each side of the rock, but the tides are so strong and uncertain that this passage should only be used in extreme necessity.

About 3 miles SW. of the St. Giles rocks is the N. point of a deep bight, call Man-of-War bay, affording the best anchorage in the island for large vessels. The only danger in it is a small rocky shoal, called the Cardinal, lying about half-way down the western side and $\frac{1}{3}$ of a mile off shore. It generally breaks and can be easily avoided.

Booby islet, steep-to on the off-shore side, but with shallow ground in-shore, lies at the bottom of the bay. There is anchorage-ground all round the bay, but it extends only a short distance off shore, the soundings changing rapidly from 40 to 20 and 10 fathoms. The best berth is in 11 to 15 fathoms of water, with Booby island bearing from SW. to WSW. Small vessels may go farther in.

The western limit of Man-of-War bay is called Corvo point, and 2 miles to the westward of it are several rocky islets, called the Brothers, bold and steep-to. One and one-half miles farther to the westward is another cluster, very similar but more numerous, called the Sisters, having 40 fathoms close to them.

Vessels should never attempt to pass inside of the Brothers, as there are several rocks in-shore of them.

Between the Brothers and the Sisters are two dangerous small rocks lying $\frac{1}{2}$ a mile off shore. One of these rocks is dry, the other has 4 feet of water on it. The sea generally breaks upon them, but not always. The passage between the Sisters and the shore should not be used except in case of emergency. In such a case keep near the Sisters to avoid these rocks.

From Corvo to Courland point, 14 miles distant, the shore is generally rocky, bold, and steep-to, and may be approached within $\frac{1}{2}$ a mile. Several rocks lie along this shore, but none of them are more than 1 cable distant.

Man-of-War
bay.

Brothers and
Sisters rocks.

Rocks.

Between these two points are several small bays, affording anchorage for coasters. They are (proceeding from NE. to SW.) Cheese, Bloody, Paletuvier, Englishman's, Castara, Flamingo, King Peter's, Cotton, and Formagier bays. Castara bay is the only one of these anchorages that can be considered as at all secure.

Courland point, on the north side of Great Courland bay, is low, woody, flat, and rocky. A few straggling houses on the point, a small church, and police station constitute the town.

The bay is about $\frac{1}{2}$ a mile wide between Courland and Hawk's Bill point and $\frac{1}{4}$ of a mile deep, with 9 fathoms of water $\frac{3}{4}$ of a mile from the shore, gradually decreasing to 3 fathoms within 1 cable of it.

The only danger is a small rock called the Barrel of Beef, nearly dry at low water and lying $1\frac{1}{2}$ cables SW. from Courland point. A good berth will be found in 8 to 10 fathoms of water, with Courland point NE. by N. and Hawk's Bill point south about half-way between the two. With the wind to the northward of east, a heavy swell rolls into the bay, but the holding-ground is excellent. This bay is the principal anchorage on the northern side of the island, and is the place where mail-steamers call.

To the southward of Hawk's Bill point there is anchorage (Stone Haven bay) in 8 to 12 fathoms, but the bottom is rocky.

Little Courland bay, the next indentation to the southward, is somewhat smoother than Great Courland bay, being protected to the northward by a salient point, on which are the ruins of an old fort.

The best anchorage here is in 7 fathoms of water, with the small rocky point, with buildings upon it, bearing ESE.

Care must be taken in leaving this bay not to be set upon the Buccoo reef, as the current generally runs strongly to the SW.

The Buccoo reef extends in a broken curved line from the Wolf rock, at the western end of Little Courland bay, to Pigeon point, the northwestern extremity of the peninsula forming the SW. end of the island. The outer edge of this reef is dry and well defined; its greatest distance from the shore is $1\frac{1}{4}$ miles. To avoid this dangerous reef in the night-

time, vessels in this vicinity should not come inside of a depth of 30 fathoms.

Buccoo bay, inside the Buccoo reef, is a dangerous place for boats, as rollers set in heavily over the shallows outside. Several fatal accidents have occurred, and the shoals are consequently called the Buccoo burial-ground.

Buccoo bay.

Milford bay lies at the western end of the island, between Sandy point on the south and Pigeon point to the northward, and affords good anchorage. There is a rock with 6 feet of water on it, lying $1\frac{1}{2}$ cables off shore. In approaching this bay care must be taken not to round too closely either the Buccoo reef or the ledge off Crown point $\frac{3}{4}$ of a mile south of Sandy point.

In order to proceed from windward to leeward the description of the southeastern side of the island is commenced at Tyrrel bay, near the north point of the island.

Southeast coast.

The SE. side of the island is continually exposed to a heavy swell, and, as the current generally sets strongly toward the shore, it should not be approached nearer than 3 or 4 miles unless bound to Tyrrel or Rockly bay.

Tyrrel bay, $2\frac{3}{4}$ miles southward from the N. point of the island, has deep water, but is not a good anchorage. Vessels of 150 tons sometimes load produce here, however. To enter it with a sailing-vessel a commanding breeze is necessary, and the only safe channel is the southern one, between S. rock (18 feet high and $\frac{3}{4}$ of a mile S. of Little Tobago) and the main-land. The passages between Little Tobago and the neighboring rocks, although deep, should not be attempted, except in an emergency, as the currents are very strong and irregular.

Little Tobago island lies 1 mile off the E. end of Tobago. It is about 1 mile long NW. and SE., of irregular shape, and 470 feet high. Its surface is very irregular, and from a distance four or five hills are seen. Near it are several dry rocks, and between it and the main-land is a small islet called Goat island.

The channels between Little Tobago and Goat island, and between the latter and Tobago, are deep, but the current sets through them very strongly to the northward.

From Tyrrel bay to King bay, $2\frac{1}{2}$ miles to the southward, the wind and current almost always set in opposite direc-

tions, making the sea rough and the coast dangerous to approach. King bay is deeper, and has smoother water than any other of the indentations on the coast of Tobago.

The best anchorage is in from 7 to 10 fathoms of water in the NE. part of the bay. There are shoals of 5 and 8 fathoms in the bay, and shoals near the shore with less water. On the windward side is one shoal of $3\frac{1}{4}$ fathoms.

The high lands surrounding the bay make the winds inside unsteady and baffling. A sailing-vessel on standing in should, therefore, have her anchors ready, and standing out should be prepared for a change in the wind on opening Pedro point on the N. side of the bay.

Southwest $\frac{1}{2}$ a mile from the leeward point of entrance to King bay is Queen island, $\frac{1}{2}$ a mile NW. of which is Queen Bay anchorage abreast the estate of Betsy's Hope. This anchorage is almost always accessible, and is easy to leave, but only fit for vessels of moderate size.

Two beacons of triangular shape and painted white have recently been erected to serve as leading marks between the 15-foot shoals on either side of the entrance to the bay. The northern one is a little W. of the residence of Betsy's Hope, and the other is on a low mound nearer the shore; in line they bear N. 70° W. and lead a little westward of the weather shoal. The anchorage is in 5 or 6 fathoms, about 2 cables off the beach.

Prince bay.

Prince bay is a continuation of Queen bay; in front of it is Roxborough rock, with 2 fathoms of water on it, and a washing-rock on the E. end of a 3-fathom shoal lying $4\frac{1}{2}$ cables SW. by W. $\frac{1}{4}$ W. of Roxborough rock. To enter the bay, pass a little to windward of the washing-rock, from which a N. course will lead to a good berth in 7 fathoms.

Inside of 5 fathoms the ground is foul all round the bay; it should not be entered with a scant wind, and it would be well to obtain a pilot from the vicinity, but not to trust him entirely. From Prince's bay to Richmond island, $1\frac{1}{2}$ miles to the southward, the coast is bordered by numerous rocks, and should not be approached:

Richmond isl.
and.

Richmond island, $2\frac{1}{2}$ miles SW. by W. of Queen island, lies 2 cables off a salient point. It is a double island with a lump on each part, and has a group of broken rocks near its E. end.

Northwest of Richmond island, within the salient point, is Mangrove bay, a secure anchorage for small vessels. A dry shoal lies directly in the entrance; pass to leeward of this, and anchor inside it in 3 or 4 fathoms.

Richmond and Goldsborough bays, farther to the SW., ^{Richmond and Goldsborough bays.} have very irregular ground off them; small vessels anchor there to load sugar, but there is no good anchorage for ships.

Smith island is small, 48 feet high, and lies $3\frac{3}{4}$ miles SW. ^{Smith island.} by W. from Richmond island. Between these two islands, off Goldsborough bay, lies the Great River shoal, extending $1\frac{1}{2}$ miles off shore and having in many places 17 and 18 feet of water, with an irregular coral bottom. To clear this shoal in passing, keep the E. point of Little Tobago island open to the eastward of Pedro point; large ships should keep the eastern hill of Little Tobago open.

With strong ESE. breezes the sea breaks heavily almost everywhere on this shoal.

Penfold bay, a small cove NW. of Smith's island, is entirely unfit as an anchorage for any class of vessel. ^{Penfold bay.}

It is separated from Barbados bay to the westward by Granby point, to the westward of which are several 2-fathom shoals, the outer one being W. $\frac{1}{2}$ N. $4\frac{1}{2}$ cables from the point. To pass to leeward of this shoal, bring the western end of the sandy beach on with Green Hill house, which is above Studley Park house, until the Little Smith island (a rock) disappears behind Granby point, then haul up quickly for a weather position in the bay; in doing this the vessel will probably get into 15 feet. The anchorage is not fit for vessels drawing more than 12 feet. ^{Barbados bay.}

Hillsborough bay, $1\frac{1}{4}$ miles westward of Barbados bay, is off the Hope estate. Vessels may anchor in the eastern part of it in 6 fathoms. The SW. limit of Hillsborough bay is a point having a bank extending from it to the eastward with 21 feet of water on it, and on which the sea breaks usually with the sea-breeze. ^{Hillsborough bay.}

Minster rock, having 6 feet of water on it, lies E. by S. $\frac{3}{4}$ S. 1 mile from Bacolet point and $3\frac{1}{4}$ miles from Smith island. It is composed of large boulders, and is steep-to. It generally breaks with the sea-breeze. To pass to the eastward of it keep Richmond island open to the eastward of ^{Minster rock.}

Smith island; and to pass to the westward of it, keep the light-house on Bacolet point on with the flag-staff of fort George on the eastern side of Rockly bay.

Light.

A pentagonal light-tower, 57 feet high, painted red and white, stands on Bacolet or Red point, at the southeastern extremity of Rockly bay, and exhibits, at an elevation of 115 feet, a *fixed white* light, visible in clear weather 12 miles when bearing between WSW. and NE. by E. Light-house ledge, with 12 feet near its end, extends $2\frac{1}{2}$ cables SW. by W. from Bacolet point. From this ledge to the town of Scarborough the depth of 5 fathoms is nowhere more than 1 cable off shore.

Rockly bay.

Rockly bay, though a safe anchorage, is never very smooth, as the trade-winds cause a constant swell to set into the bay. There are several dangerous shoals in the middle and western parts of Rockly bay. The outermost of these is the "Bulldog," with $1\frac{1}{4}$ fathoms on it, lying SW. by W. 2 miles from Bacolet point, and generally breaking. Several shoals of from 9 to 15 feet lie W. by S. $\frac{1}{2}$ S. 1 mile from Bacolet point and ESE. from the Red rocks (38 feet high) in the western part of the bay. These shoals only break with fresh trade-winds.

Middle shoal.

In the upper part of the bay above the anchorage for large ships there is a shoal with 10 feet of water on it 2 cables long NW. and SE. The outer end of this patch is $3\frac{1}{2}$ cables from the eastern shore and 5 cables off the western beach. Scarborough, the principal town in Tobago, is situated on the NW. slope of Fort George hill, at the head of Rockly bay. It shows but little except from the upper part of the bay. Bacolet point, on which the light-house is situated, must not be approached till a tall chimney, situated two-thirds up the slopes of the island, is brought open of the rocks on the eastern shore under Fairfield NW. $\frac{1}{2}$ N. This mark clears the Light-house ledge.

The leading mark through the middle of the clear ground between the Light-house ledge and the western shoals is the SE. corner of the first large stone on the beach in line with Montpellier mill, (half way up the slopes of the hills,) and also with a notch between two hills very much alike on the top of the ridge bearing NNW. $\frac{1}{2}$ W. This mark cannot be mistaken. Stand in on this line till a single cocoa-tree a

little above the eastern shore comes on with fort George flag-staff N. 23° E. when immediately alter the course $1\frac{1}{2}$ points to the westward, or for a cocoa-tree on the main ridge of the island at Amity Hope; this new course will lead fairly into the anchorage above the middle shoal. Large ships had better not go beyond this shoal, but should anchor in 14 to 16 fathoms with fort George bearing NE. to NNE. Small vessels may anchor toward the lead of the bay with the church-street in line.

These directions for entering Rockly bay are for vessels under steam and in the day-time; on ordinary occasions with the usual breeze a sailing-vessel could keep the same track, but if not and with a wind inclining to the northward, care is necessary when standing to the NW. not to bring Breeze Hall, a large house near the sea, open eastward of Orange Hill windmill, for very dangerous shoals of from 9 to 14 feet lie immediately to leeward of this line; therefore tack when or before these objects are in one, and, avoiding the light-house ledge in standing back, keep toward the eastern shore till the anchorage is reached. To avoid the middle shoal when intending to anchor above it, the east shore must be kept near, taking care not to bring the spire of the Protestant church to the eastward of NNE. until the vessel can fetch into the inner anchorage, recollecting also that off Fairfield 12 feet will be found quite 1 cable from the rocks. Sailing-vessels in leaving Scarborough will generally have the wind scant in coasting. Be careful of the middle shoal, and keep near the eastern shore until you can weather all the shoals to leeward. In making the SW. board, being outside the middle shoal, tack on the Breeze Hall house and Orange Hill windmill line as before. The morning is the best time for leaving, as the wind then inclines to the northward, and a vessel may lay clear out in one stretch.

In rounding the "Bulldog" shoal the two-story house on the eastern shore should be kept open of French Hill, a green, grassy hill seen over the eastern slope of fort George, bearing N. by E. $\frac{3}{4}$ E.

Columbus point is 5 miles SW. by W. $\frac{1}{2}$ W. from Bacolet light-house. It is low and projecting, and is skirted by a reef close in shore with deep water outside. Between it and

Columbus
point.

Crown point, the SW. end of the island, shallow ground extends 1 mile off, decreasing to 4 cables south of Crown point.

Drew bank. Drew bank, off the SW. end of Tobago, is 5 miles long and 2 broad, and has a general depth of from $4\frac{1}{2}$ to 8 fathoms.

It has, however, two dangerous shoals upon it—the Wasp shoal at the north end, and the Drew shoal 1 mile from its SW. extremity.

Wasp shoal. Wasp shoal, with its shallowest spot of 17 feet at the north end, lies SSW. $\frac{1}{2}$ W. 2 miles from Crown point. The passage between is deep, but requires care in navigating it. Ships drawing more than 16 feet are recommended not to take this channel.

No good mark for passing to the northward of Wasp shoal can be given, but by keeping Columbus point bearing E. $\frac{1}{2}$ N. a vessel will pass midway between it and the ledge off Crown point.

Columbus point in line with Bacolet Point light-house leads south of the Wasp shoal, and the Drew bank can be crossed on this line, hauling more to the westward when Pigeon point comes open of Sandy point.

Drew shoal. Drew shoal, on which the least depth yet found is 21 feet, lies SW. $\frac{1}{2}$ S. $5\frac{3}{4}$ miles from Crown point, and to large ships passing between Tobago and Trinidad is a formidable danger.

There are no good marks in Tobago to be recognized by a stranger for clearing the SW. edge of the Drew bank, a plain direction being to keep midway between the islands, and when the NE. point of Trinidad (point Galera) bears S. by E. a vessel may haul to the northward. In fine weather, with a good lookout for change of color in the water and keeping the lead going, it may be skirted closer. There is generally a ripple at the edge of the bank, and when the sun is high the white water may be seen before reaching it, but as soon as a depth of 10 fathoms is reached haul to the southward if the vessel draws more than 18 feet.

The island of Tobago lies in the fairway of the equatorial stream, which rushes to the NW. along the NE. coast of South America. This current striking on the S. side of Tobago is divided into two branches; the eastern one being deflected to the northward runs at an average rate of 4

miles an hour, the western one trends more to the NW., and though slightly modified by local tides is too strong generally for a sailing-vessel to beat up against.

Navigators should, in this vicinity, allow for a considerable set to the NW.; vessels bound to the Dragon's Mouth channels, on the N. side of Trinidad, pass on either side of Tobago; but the passage to the northward of this island is wider and preferable.

Between Tobago and Barbados the current is generally, but not always, found setting to the NW. at the rate of 1 to 2 miles per hour.

The tides about Tobago are uncertain and irregular, their general effect being that the flood accelerates while the ebb retards the NW. current. At the east end of the island the flood presses the current in shore while the ebb carries it off.

At the W. end of the island the flood runs to the SE. close round Crown point and over Wasp shoal for 2 hours, slightly checking the stream, but soon being overcome.

At Courland bay the flood sets slightly to the E. and the ebb to the westward.

At the Buccoo reef there is only a slight in-draught into the lagoon on the flood, the ebb sets past it to the westward, and, aided by a slight current, runs sometimes 1 mile an hour.

Working to windward on the coast of Tobago will be attended with difficulty, except on the N. side, inside the range of the current, and then on arriving at the Melville rocks a vessel will require a strong northerly wind to enable her to cross the stream; should she, however, lie up SE. by E., she will soon make easting enough to keep away and run free against the stream if bound to Scarborough. In doing this, however, take care not to fall to leeward near Little Tobago.

Being at the W. end of the island, and desirous of going up the S. side of Scarborough, a vessel should haul as close round Crown point as the ledge will allow, and if able to lie up SE. by E. may continue on the port tack till E. of the NE. point of Trinidad. Here the current will be found setting to the northward, and from here short tacks to windward should be made, finally making one stretch across to

the island of Tobago. This, however, can only be done with the wind inclined to the northward and a weatherly vessel.

With a favorable breeze a vessel can work to windward from Scarborough.

Off Smith island the westerly current will be found faint, and off Richmond island slightly favorable.

Pedro point and rocks S. of Little Tobago should be avoided, as the current is very strong near them, and with light winds renders a ship unmanageable.

It is high water, full and change, at 3^h; springs rise 4 feet and neaps 2, but very irregular.

Winds.

At this island the trade-winds do not blow very steadily, but are fitful and uncertain. Calms are very frequent, especially during the hurricane months. Much rain falls, and short squalls frequently occur. It has been said that Tobago was out of the line of hurricanes, but this is not strictly true, for minor ones have lately occurred both here and at Trinidad. It is certainly to the southward of the average track, but is not altogether free from these visitations.

Ground-swell.

The N. side of this island is, during the winter months, subject to ground swells. These generally set in with light winds, strong trades apparently keeping the sea down; occasionally it becomes very heavy and dangerous at the Buccoo reef and the Drew bank. Vessels have in consequence had to leave the northern bays, the holding-ground becoming disturbed.

CHAPTER XI.

THE BERMUDA ISLANDS.

Variation in 1876:

7° 30' W.

This group was formerly called the Somers islands, from Sir George Somers, who was shipwrecked here in 1609. The origin of the present name is somewhat doubtful, but it is generally considered that it arose from the fact that an early Spanish navigator named Juan Bermudez discovered them in 1527. Another account states that the Spanish ship Bermudas was wrecked here in 1522. The islands were granted by Philip II of Spain to a Portuguese named Ferdinand Camelo, who was the first person to land here, in 1543. His landing-place on the S. shore of the largest island still bears his initials, "F. C., 1543," surmounted by a cross. The earliest account of them is by Henry May, who was wrecked here in a French ship in 1593.

They were first settled by the English in 1612, and have remained ever since in their possession. The group consists of about one hundred islands, most of which are very small, the principal ones which are inhabited being St. George, St. David, Hamilton, Somerset, and Ireland. The population in 1872 was 12,785, of whom rather more than 5,000 are white.

The government is administered by a military governor appointed by the British government. This group forms a most important military and naval station, all commanding points being strongly fortified.

There is a complete dock-yard establishment at Ireland island, with every requisite for refitting and docking the largest ships.

The enormous iron floating-dock has had a basin excavated for it, and can take up vessels of the largest size. Although intended for Her Majesty's vessels, other vessels in distress can be repaired there, or have their steam-machinery repaired at the dock-yard.

The principal trade is with the United States, large quantities of fresh vegetables being exported there. Steamers from New York arrive and depart every two weeks, and the steamers running between Halifax and St. Thomas twice a month touch at St. George.

Climate.

Being situated between the parallels of 32° and 33° N., about an equal distance from the West India islands and British North America, the climate is a mean between the two, partaking neither of the extreme heat of the one nor of the excessive cold of the other. Owing to the Gulf stream, which passes between the Bermudas and the American continent, the climate is greatly ameliorated, the winter months resembling the early part of October in England, but without its frost; gardening is pursued during this part of the year, while the tropical productions of the West Indies are cultivated during the heat of the summer.

The winter or cold season is the most agreeable, and lasts from November to March. In the latter part of February spring commences, and the weather usually continues mild, with refreshing showers and gentle breezes from south and west, until the end of May. In June the summer sets in, and the weather becomes hot. Calms now succeed to the gentle breezes of May; the air is sultry and oppressive, and long droughts are common, which are often broken up by heavy thunder-storms. In September the weather changes its character, and becomes again mild and agreeable. Hurricanes and tempests are frequent, and few autumns pass without them, of more or less violence; the squalls are heavy and sudden, occurring particularly in the winter season.

The whole of these islands lie on the southeast side of an oval-shaped coral reef, nearly dry at its edges, 21 miles in length northeast and southwest, and from 6 to 11 miles in breadth. They are composed of sand and limestone more or less compact, and clothed principally by cedar-trees, of sufficient size for the scantling of boats and vessels as large as 250 tons. They are irregularly hilly, and the valleys contain a rich vegetable soil, capable of producing abundant crops of arrowroot, potatoes, and other vegetables, which are largely exported; as is also a small quantity of straw plat and tropical fruits. The inhabitants have to depend

almost entirely on rain-water caught in stone tanks, which are attached to the houses for this purpose. There are a few wells, but they are only resorted to in a case of necessity.

St. George, the northeastern island of the group, is nearly ^{St. George island.} 3 miles in length in a northeast and southwest direction, and a little more than $\frac{1}{2}$ a mile across at the broadest part; in the centre, however, it is nearly cut in two by a shallow bight. On the south side of the northern part the land forms an elbow, and here there is a considerable town, formerly the seat of government, and in front of it a secure harbor, protected by St. David and other islands, for vessels of 14 or 16 feet draught, which can cross the bar at high water.

There is a marine railway at St. George, where vessels of 800 tons can be taken up, and repairs of all kinds, except to machinery, can be well and quickly made.

On the bluff of St. Catherine point, the northeast extreme of St. George and of the whole group, fort St. Catherine stands conspicuous from its isolated appearance, a narrow strip connecting it to the higher land at the back, which is steep, and moderately wooded on its northern side, fort Victoria crowning the summit, about 150 feet above the sea. To the southwest of the latter is fort St. George, 164 feet above the sea, distinguished by its flag-staff and yard, and here every vessel approaching the island is signaled.

St. David island is about 2 miles in length east and west, ^{St. David island.} but its shores are very irregular. Its east end terminates in a bold rocky promontory between 70 and 80 feet high, thickly covered with cedar, called St. David head, which forms the eastern extreme of the group.

Hamilton, Long, or Bermuda island, the largest of the group, is about 13 miles in length, and near the middle $1\frac{1}{2}$ in breadth; its shores, however, are very irregular, and so is its surface. The highest part, called Gibbs hill, near the southwest end of the island, is 256 feet high.

The town of Hamilton stands near the centre of the island, ^{Town of Hamilton.} on the north side of Hamilton or Crow Lane harbor, and is the seat of government. The harbor is convenient, well

sheltered, and capable of receiving vessels of 10 or 12 feet draught alongside the wharf in front of the town.

Supplies of all kinds can be obtained here. Beef is brought from the United States. Poultry is good and plenty, and fish are caught in abundance.

Large numbers of visitors, attracted by the mild climate, come here from the United States to spend the winter.

Light.

A white circular iron light-house stands on the round, barren, rocky summit of Gibbs hill, in lat. $32^{\circ} 15' 4''$ N., long. $64^{\circ} 51' 36''$ W., which exhibits 362 feet above the sea a *revolving* white light, attaining its greatest brilliancy every *minute*, and seen in clear weather about 24 miles. The light is intercepted by some hills to the northeast of it, between the bearings of S. $40^{\circ} 30'$ W. and S. $44^{\circ} 30'$ W., also between S. 46° W. and S. $54^{\circ} 30'$ W.

In steering for Bermuda at night or in thick weather it is advisable not to go to the northward of the parallel of $32^{\circ} 8'$. In coming from the southeast, the light should not be brought to the southward of W. by S. $\frac{1}{2}$ S., or during the night approached nearer than 6 or 7 miles. Coming from the westward, it should be kept at the distance of 10 or 12 miles until it bears northward of NE. by E. A vessel from the northward sighting the light should haul off immediately, as the reefs extend off in that direction 16 miles.

Somerset island is about 2 miles long north and south, $\frac{1}{4}$ to 1 mile broad, and generally not so elevated as the others.

Ireland, the northwestern island, is nearly $1\frac{1}{2}$ miles long northeast and southwest, about $\frac{1}{4}$ of a mile broad, and is entirely occupied by the government establishments.

Grassy bay, just to the eastward of Ireland island, is the principal anchorage for men-of-war.

The reef.

The southeast side of the remarkable reef—from which the Bermudas rise—from St. David head to the light-house, is bounded by the islands which lie in most parts within $\frac{1}{4}$ of a mile of the edge, with the 100-fathom line about 1 mile beyond it; the depth of 10 fathoms being almost alongside the reef. Nearly abreast the light-house the reef extends 1 mile from the shore, and thence it takes a westerly direction for about 8 miles, and the outer detached parts are called the Southwest breaker, Chaddock, Little, and Long bars. It then sweeps round to the north and northeast, passing

about 6 miles from Somerset island, continuing with an outward curve to North rock.

North rock shows as three sharp pinnacles, 8 feet above high water. It lies on the very edge of the reef, and from it the light-house bears S. by W. $\frac{1}{4}$ W. $13\frac{3}{4}$ miles; the north-east part of Ireland island S. by W. $\frac{1}{2}$ W. $9\frac{1}{4}$ miles; and St. Catherine point, the north extreme of St. George, SE. nearly 7 miles.

North rock.

From this rock the reef trends about E. by N. and E. for nearly 5 miles, passing $5\frac{1}{2}$ miles northward of St. Catherine point, when it sweeps round to the SE. and S. and terminates $\frac{1}{2}$ a mile from St. David head. There are several narrow openings through this great barrier, leading into secure anchorages, but only one navigable for ships of large draught.

Mills breaker, N. by E. $\frac{3}{4}$ E. $2\frac{3}{4}$ miles from St. David head, and NE. by E. $\frac{1}{2}$ E. about $2\frac{1}{2}$ miles from St. Catherine point, is on the eastern edge of the reef, and dries at low water. A buoy has been placed near Mills breaker, NNE. $2\frac{3}{4}$ miles from St. David head, but it frequently goes adrift, and cannot, therefore, be depended upon.

Soundings of from 10 to 15 fathoms extend seaward for nearly 3 miles from this part of the reef, and to the southward of Mills breaker the edge of the bank gradually approaches the shore to about 1 mile off at Gurnet rock. A patch of $11\frac{1}{2}$ fathoms, on the edge of the bank, lies E. by N. $\frac{3}{4}$ N. $4\frac{1}{4}$ miles from Mills breaker.

Five-Fathoms Hole anchorage, sometimes called Jervis roadstead, is open to all winds from WNW. round by N. to SSW., with no protection from the sea except what the reefs afford, and that only from the former bearing to NNE. It may, therefore, be considered nothing more than a stopping-place for a pilot. In favorable weather, with the wind from NW., a vessel may anchor in from 7 to 9 fathoms water, with St. Catherine point bearing WNW., but care should be taken to select a clear sandy spot; for the darker ones, which may generally be detected from aloft, especially on a bright sunny day, are rocky coral heads, and by anchoring on them the loss of the anchor is risked. The mariner should be prepared to quit the moment the winds begin to veer.

The Narrows, or Ship-channel, is at the E. end of the group abreast St. George island, where the reef is broken up into detached masses. It is, however, so tortuous and narrow that without a leading wind and the assistance of the buoys which point it out it would be impassable, even with the help of the pilots, who are guided mostly by the eye. No marks are available, and it would be useless to attempt to give directions.

The water is deep, and there are from 6 to 9 fathoms, until near the last four buoys of the channel, northward of St. Catherine point, where there are some few small shallow patches with 24 feet on them at the lowest tide, and 5 or 6 feet greater depth close to them. After crossing the line of the two flag-staffs, Victoria and St. Catherine, a vessel will be clear of the shoalest part; and about midway between the two northwest buoys of the channel the least depth will be $4\frac{1}{2}$ fathoms.

Buoys.

The entrance to the Narrows is between two buoys. That on the NE. side is a large checkered *black* and *white* buoy in 26 feet water on a coral patch, with the centre of fort Cunningham bearing SW. and St. David head S. On the SW. side is the outer fairway buoy, *black*, with staff and globe, SE. $\frac{1}{4}$ S., nearly 600 yards from the NE. buoy, with fort Cunningham W. by S. $\frac{1}{2}$ S. and St. David head S. by W. Between these buoys there are $6\frac{1}{2}$ fathoms water over sandy bottom.

The channel runs nearly NW. and SE., and is well marked with checkered *black* and *white* buoys on the NE. side, and *black* on the SW. The outer black buoy, called by the pilots the bar-buoy, has a staff and globe on it. Within the buoy the ground is foul, interspersed with clear sandy patches, but no anchorage for vessels of any burthen.

Inside the Narrows and in the N. part of Murray anchorage is a *red* nun-buoy, with "Fairway" painted on it, in $9\frac{1}{2}$ fathoms water. This buoy is a guide when opening the channel leading through the Narrows, and should be kept well on the port hand by vessels proceeding to sea.

Murray anchorage.

Inside the reefs and to the northward and westward of St. George island is Murray anchorage, clear of shoals, with from 8 to 9 fathoms of water, with good holding-ground.

In the winter the strong NW. gales make it very rough here.

At Murray anchorage foreign vessels of war anchor till permission is received from the governor to go nearer the dock-yard.

The first-class pilots are experienced men, but in piloting a long and heavy ship through the Narrows, familiarity with the capabilities of the ship, as well as great judgment and nerve, are necessary; as it is possible also that shallow heads may exist similar to that on which H. M. S. *Ariadne* touched in 1872, with 22 feet water on it, (since deepened to 24 feet by blasting,) caution is necessary. The general rule with the pilots, who are always to be obtained, is to give the checkered buoys the closer berth. Pilots are ready to go off in any weather to board vessels needing their services, and are frequently picked up 3 or 4 miles to the southward of Gibbs Hill light-house.

Pilots.

Coming from the northward, St. David head bearing SW. by W. will lead eastward of all the shoals. From the southward, St. David head may be safely rounded at the distance of 1 mile; and when it bears S. by W., and St. Catherine outer bastion NW. by W. $\frac{3}{4}$ W., a vessel will be in a good position for Ship-channel or the bar of St. George harbor.

Directions.

On one of the shoal patches there are only 18½ feet, which lies with fort St. George over the center of New fort, bearing W., and Trotts, west chimney on with Pink house S. by W. $\frac{1}{4}$ W. Trotts house is a moderate-sized building on the northern slope of St. David island, westward of the head, and is conspicuous from its white appearance amongst the trees. Pink house is not so prominent; it stands back on the higher land, and much shut in, except from the spot it marks.

Cherry-stone hill is 108 feet high, conical, and rises on the NW. side of St. George island; it is steep and abrupt on its NE. side, and is the highest peak seen southward of fort George.

On the SE. point of St. George island stands all that remains of the Old fort or Town-cut battery; it is a square stone ruin, hardly visible at any distance from seaward, and lies about midway between St. David head and St. Catherine point. Close to the SE. of the fort is a small rocky islet,

called Higgs island, dividing the passage between St. George and Paget islands into two boat-channels, the northern of which is called Town cut. It is through the outer part of this channel Cherry-stone hill is seen, bearing W. $\frac{1}{2}$ S.

About $\frac{1}{2}$ a mile NW. $\frac{1}{2}$ W. from St. David head, on the first bare patch of moderately high land, (about 73 feet,) is fort Cunningham on the SE. part of Paget island, which is nearly $\frac{1}{3}$ of a mile in length.

St. George
channel.

On the northern part of St. David island, and less than half-way to the head, are the leading marks for passing over the bar into St. George harbor. The northern one is a tall stake painted *white*; the southern a broad stone pillar painted *white*, also with a *black* stripe down its middle and sea face, and standing SSW. westerly, about 380 feet from the stake.

Half-way between these marks and fort Cunningham is the entrance to the harbor. A small rocky islet, called Governor island, lies nearly in the center of the channel, and on its SE. part stands a *white* stake, one of the marks for the Manhattan shoal; and about 150 yards SW. $\frac{1}{2}$ W. from it, on the eastern part of Smith island, is the inner stake. The Manhattan shoal is close to the entrance of the harbor, and a *black* pole is moored on it in 14 feet water, rocky bottom.

The bar channel is marked by *white* nun-buoys and poles on the western side, and *black* nun-buoys on the eastern. From the Five-fathom hole with the pillar and stake in line, bearing SSW. westerly, the least depth carried in is 18 feet. After passing the first four buoys a *white* pole will be seen on the Elbow, which leave to the westward. When the marks for the Manhattan shoal are on, keep them so until nearly up to the *black* pole, leaving it on the port hand or to the southward, and then steer in for the anchorage with Whale house, a low white building on NE. part of Smith island, and the only building seen, well open of Paget island.

Boiler channel.

Boiler channel is southeastward of St. George channel, and along by the shore of St. David island, and is used when the weather is moderate and the wind scant through St. George channel. The entrance is between two poles distant about a quarter of a mile from the shore. The *black*

or eastern one is in $9\frac{1}{2}$ feet, and the *white* or western pole is in 14 feet. This channel is very narrow and only used by small vessels. The leading mark through is Whale house, showing over the SE. part of Paget island bearing W., and the least water is 15 feet.

The next opening lies about 2 miles to the SW. of St. David head, leading into Castle harbor, a circular basin of about 2 miles in diameter, with, in places, as much as 6 fathoms water, but it is filled with shallows. The channel into it has a depth of 18 feet, but it is so extremely intricate and dangerous that it is never used. Castle harbor.

Hog-Fish cut is at the SW. end of Hamilton island, about 2 miles westward of the light-house, through which small island vessels thread their way by the eye into Elies harbor. This snug little basin is formed between the ends of Hamilton and Somerset islands. On the NW. part of the former there is a small conical hill about 150 feet high, called Wreck hill, which is very conspicuous, and a useful object in approaching from the N. or S. Hog-Fish cut.

On the NW. side of the reef there are three more openings, called the Chub and Blue cuts, through which small traders find their way into Grassy bay and Hamilton harbor, passing close along the NW. side of Ireland island, but no directions can be given for them. Chub and Blue cuts.

There are also two more openings, one on either side of North rock, capable of being navigated by vessels of large draught, provided they are previously buoyed, and the wind and weather favorable. North Rock cuts.

It is high water, full and change, about $7^h 14^m$ both at St. George and Ireland islands; the rise at springs is about 4 feet, but it is uncertain. At neaps the rise sometimes is not more than 1 foot. Northerly winds cause the highest, and southwesterly the lowest, tides; the force of the stream is also variable, and probably affected by the current prevailing outside.

The flood from the eastward round St. David head sets into St. George harbor and through the Narrows nearly in the direction of the channel, to off St. Catherine point, where it sweeps round to about WSW., and sets $\frac{1}{4}$ of a knot to 2 knots an hour, according to the force of the wind. The ebb runs with the same force from the SW. toward St.

Catherine point, where it diverges to the ESE., trending more southerly eastward. Off St. George it is strengthened by the stream through the ferry and harbor to seaward. About the Sea Venture shoals, on the N. side of the Narrows, it sets in all directions, and stronger about the buoys near these shoals, which is the narrowest part of the channel.

S. W. bank.

Southwest bank, of small extent, with 24 fathoms water on it, lies SW. $\frac{1}{2}$ W. $13\frac{1}{2}$ miles from Gibbs hill; and nearly midway between it and the reefs is a patch of 23 fathoms. Ocean depths are found near these patches.

Current.

The Bermuda islands are about 240 miles to the southward and 400 to the eastward of the outer limits of the Gulf stream. Hence the current in the neighborhood is exceedingly variable, both in force and direction, as will be seen by the table that follows. Generally, however, it appears to be greatly influenced by the wind, particularly if it has blown from the same point for several days, when its velocity may be found to be 1 knot an hour, or more, in the opposite direction. The utmost attention to the reckoning is therefore requisite, and should the vessel's position be at all doubtful, and the weather unfavorable for seeing the light, the parallel should not be crossed in the night-time, for the edge of the bank is too close to the reef for soundings to give safe warning.

Winds.

The Bermuda islands appear to lie near the northern limit of the variable winds, and also on the track of hurricanes and revolving storms passing off and along the shore of America, which is distant about 600 miles. The revolving winds which pass over the islands vary in strength from breezes to storms. In the summer season the winds are light and usually steady for a considerable time, blowing in straight lines or on one point, with but little fluctuation in the barometer. But after the commencement of November, veering winds, of various degrees of force, set in and gradually become frequent, yet they seldom follow in such rapid succession as that one gale becomes confounded with another. Light winds and very fine weather usually intervene between the passage of revolving winds; while, at other times, hard-blowing straight-line winds with a high barometer are experienced.

The arrival of such succeeding progressive rotary winds is indicated by the barometer falling, as well as by the increase of the wind's force, which will often occur suddenly. Except in the case of great storms perfect regularity in the fall and rise of the barometer, and in the changes of the wind, will not be found; for the direction of the wind, as well as the atmospheric pressure, is no doubt modified by other revolving gales or strong winds blowing at the same time, but when whirlwinds, tempests, or hurricanes blow they overpower such irregularities.

In the winter season northerly winds sometimes blow hard without veering for two and three days together. The air is then dry and cold, and while the thermometer falls, the barometer remains stationary, or rises a little. Misty weather is very uncommon, but it constantly happens that a change of weather is first announced by increase of both temperature and moisture in the air. The December gales generally commence from the S., veer round by the W., and terminate at about NW. or NNW.

During the winter months most of the gales which pass along the coast of North America are revolving gales. Vessels from Bermuda, bound to that shore, should therefore put to sea when the NW. wind, which is the conclusion of a passing gale, is becoming moderate and the barometer is rising to its usual level. The probability is, more particularly in the winter season, that after a short calm the next succeeding wind will be easterly, the first part of a fresh revolving wind coming up from the SW. quarter.

Directions.

A ship bound to New York or the Chesapeake might sail while the wind is still W. and blowing hard, provided the barometer indicates that this W. wind is owing to a revolving gale which will veer to the northward. But as the usual track which gales follow in this hemisphere is northerly or northeasterly, such a ship should be steered to the southward. As the wind at W. veers toward NW. and N., the vessel would come up, and at last make a westerly course, ready to take advantage of the E. wind at the setting in of the next revolving gale.

A vessel at New York and bound to Bermuda, at the time when a revolving gale is passing along the American coast, should not wait in port for the westerly wind, but sail as

soon as the first portion of the gale has passed by and the NE. wind is veering toward the N., provided it should not blow too hard; for the N. wind will veer to the westward, and become every hour fairer for the voyage to Bermuda. A great number of gales pass along the coast of America, following nearly similar tracks, and in the winter make the voyage between Bermuda and Halifax very boisterous. These gales, by revolving as extended whirlwinds, give a northerly wind along the American continent, and a southerly wind on the whirlwind's opposite side far out in the Atlantic. In sailing from Halifax to Bermuda, it is desirable for this reason to keep to the westward, as affording a better chance of having a wind blowing at N. instead of one at S., as well as because the Gulf stream sets vessels to the eastward.

When vessels from Barbados or its neighboring West Indian islands sail to Bermuda on a direct course, they sometimes fall to the eastward of it, and find it very difficult to make when westerly winds prevail. They should, therefore, take advantage of the trade-wind to make the 68° or 70° of longitude before they leave the parallel of 25° N.

Table of latitudes and longitudes.

NOTE.—Those longitudes marked * have been determined telegraphically.

FLORIDA REEFS.

Place.	Exact location.	Latitude, north.	Longitude, west.	Authority.
Cape Canaveral.....	Light-house.....	28 27 37	80 31 36	United States Coast-Survey.
Jupiter inlet.....	do.....	26 55 26	80 5 5	Do.
Fowey rocks.....	do.....	25 35 21	80 5 43	Do.
Caycroft reef.....	do.....	25 13 15	80 12 42	Do.
Alligator reef.....	do.....	24 51 2	80 37 7	Do.
Sombrero cay.....	do.....	24 37 36	81 6 40	Do.
Sand cay.....	do.....	24 27 10	81 52 40	Do.
Key West.....	do.....	24 32 58	81 48 4*	Do.
Rebecca shoal.....	do.....	24 34 55	82 35 13	Do.
Fort Jefferson, (Dry Tortugas).....	do.....	24 37 46	82 52 50	Do.
Loggerhead cay.....	do.....	24 38 4	82 55 42	Do.

BAHAMA BANKS AND ISLANDS.

Navidad bank.....	Centre of each side.....	20 2 0	68 47 24	Captain Owen, R. N.
Silver bank.....	East extreme.....	20 35 0	69 21 24	Do.
Square Handkerchief bank.....	North-east breaker.....	21 6 30	70 29 54	Do.
Grand Turk island.....	Light-house.....	21 31 0	71 7 40	Admiralty light-list.
South Caricos.....	Parson's point.....	21 29 33	71 31 30	Lieutenant Lawrance, R. N.
French cay.....	West point.....	21 30 0	72 12 51	Captain Owen, R. N.
West Caicos.....	Hill at south-east end.....	21 37 30	72 28 33	Do.
Fort George cay.....	Old magazine.....	21 54 0	72 7 14	Do.
Inagua island.....	Light-house.....	20 56 0	73 40 45	Admiralty light-list.
Do.....	North-west point.....	21 7 10	73 40 21	Lieutenant Lawrance, R. N.
Little Inagua island.....	do.....	21 30 40	73 42 33	Captain Owen, R. N.
Hog-sty reef.....	North-west cay.....	21 40 30	73 51 3	Do.
Mariguana island.....	South-east point.....	22 16 30	72 47 3	Do.
Do.....	North-west point.....	22 27 40	73 33	Do.
Piana or Flat cay.....	do.....	22 34 38	73 38 3	Do.
Samana or Atwood cay.....	West point.....	23 5 30	73 49 33	Do.
Crooked island.....	Moss flag-staff.....	23 47 30	74 20 24	Do.
Castle island.....	Light-house.....	22 6 40	74 20 40	Do.
Bird island.....	do.....	22 51 0	74 22 51	Do.
Fortune island.....	South end.....	22 32 40	74 22 54	Do.
Walling's island.....	Hinchinbrooke rock.....	23 56 40	74 28 34	Do.
Run cay.....	Harbor point.....	23 37 45	74 50 8	Do.
Concepcion island.....	West bay.....	23 50 50	75 7 27	Do.
St. Domingo cay.....	Centre.....	21 42 0	75 45 9	Do.

Table of latitudes and longitudes—Continued.
 BAHAMA BANKS AND ISLANDS—Continued.

Place.	Exact location.	Latitude, north.	Longitude, west.	Authority.
Cay Verde	Hill at south end	22 1 15	75 10 34	Captain Owen, R. N.
Ragged island	Gun Point	22 14 2	75 45 17	Do.
Narn cay	East Point	22 20 44	75 28 20	Do.
Nurse channel	Channel Cay beacon	22 31 15	75 51 41	Do.
Long island	North point	22 51 0	74 51 54	Do.
Do	North point	23 41 0	75 19 24	Do.
Long island, Clarence harbor	Lochaber dig-staff	24 5 45	74 59 0	Captain Barnett, R. N.
Great Emma island	Beacon on Slocking island	23 32 15	75 46 24	Do.
Wide opening	Danger cay	24 25 30	76 40 23	Do.
Wax Cay cut	Rock southwest of Bush hill	24 34 25	76 47 24	Captain Owen, R. N.
Highborn cut	Flag-staff	24 43 15	76 48 49	Captain Barnett, R. N.
San Salvador	Northwest point	24 41 10	75 46 24	Captain Owen, R. N.
Eleuthera island	Do	25 26 15	76 37 8	Do.
Do	Cow and Bull	25 11 15	76 15 17	Do.
Royal island	Pigeon cay	25 31 20	76 51 43	Do.
Nassau	Eastern pap	25 5 37	77 22 23	Captains Owen and Barnett, R. N.
Andros island	Light-house	24 39 30	77 42 30	Do.
Andros island, Morgan bluff	High cay	25 10 40	78 1 36	Do.
Great Stirrup cay	North extreme	25 49 45	77 54 46	Do.
Little Stirrup cay	Flag-staff	25 49 12	77 57 6	Do.
Great Isaac cay	West end	26 2 0	79 6 30	Admiralty light-list.
Gun cay	Light-house	25 34 30	79 18 48	Captains Owen and Barnett, R. N.
Cay Sal or Double-Headed Shot cay	do	25 56 30	80 27 48	Do.
Cay Labos	do	22 22 50	77 35 9	Do.
Ginger cay	Centre	22 44 50	78 6 30	Do.
Abaco island	Light-house	25 51 30	77 11 9	Do.
Bahama island	West point	26 41 18	79 0 38	Do.
Memory rock	Centre	26 56 53	79 6 54	Do.
Walker's cay	Highest part	27 15 42	78 23 48	Do.
Little Guano or Elbow cay	Light-house	26 31 10	76 53 0	Do.

CUBA.

NOTE. The longitudes of points in Cuba, as given in the West India Pilot, are said to depend upon the Morro Castle light-house, Havana, being in longitude west $82^{\circ} 29' 13''$. As, however, the recent telegraphic determination places this point in longitude west $82^{\circ} 21' 30''$, the longitudes of dependent points have been decreased by $42'$, to correspond with the new determination.

Cape Mayal	Light-house	20 15 10	74 9 42	Spanish.
Port Guantamo	Eastern point of entrance	19 55 0	75 15 18	Do.
Santiago de Cuba	Blanca battery	20 0 16.4	75 50 30.15*	Lieutenant-Commander Green, U. S. N.

Cape Cruz	Light-house.....	19	50	0	77	43	48	Captain Owen, R. N.
Cienfuegos.....	do.....	22	1	0	80	29	18	Spanish.
Piedras cay.....	do.....	21	58	0	81	2	18	Captain Owen, R. N.
Isle of Pinos.....	Point Francis.....	21	37	15	83	11	52	Do.
San Felipe cays.....	Southwest point.....	21	55	0	83	31	18	Do.
Cape San Antonio.....	Light-house.....	21	51	30	84	57	22	Do.
Colorados reef.....	West end.....	22	9	0	84	47	18	Lieutenant Raper, R. N.
Havana.....	Morro light-house.....	23	9	21	82	21	30*	Lieutenant-Commander Green, U. S. N.
Do.....	Transit pier in arsenal yard.....	23	8	3	82	21	17	Do.
Peak of Matanzas.....	Summit.....	23	1	54	81	43	18	Lieutenant Raper, R. N.
Cay Piedras.....	Light-house.....	23	14	42	81	7	35	Captain Barnett, R. N.
Bahia de Cadiz cay.....	do.....	23	13	0	80	29	18	Do.
Paredon Grand cay.....	do.....	22	29	3	78	9	11	Commander Parsons, R. N.
Cay Conites.....	South point.....	22	11	14	77	39	23	Do.
Cay Verde.....	Northwest end.....	22	8	45	77	37	33	Do.
Maternillos point.....	Light-house.....	21	40	6	77	8	15	Do.
Port Nuevitas.....	do.....	21	37	30	77	4	34	Commander Hamilton, R. N.
Port Padre.....	Guinechos point.....	21	18	30	76	35	34	Spanish.
Port Naranjo.....	East side of entrance.....	21	7	30	75	52	18	Do.
Peak of Salma.....	Summit (885 feet).....	21	7	0	75	47	40	Commander Parsons, R. N.
Port Nipe.....	Rona point.....	20	47	14	75	33	18	Rear-Admiral Milne, R. N.
Port Sama.....	East side of entrance.....	21	9	0	75	47	18	Spanish.
Lucrécia point.....	Light-house.....	21	4	38	75	37	13	Do.
Port Cayo Moa.....	Careneto point.....	20	41	41	74	52	18	Commander Hamilton, R. N.
Port Baracoa.....	Light-house.....	20	21	0	74	27	48	Spanish.

JAMAICA, WITH ADJACENT CAYS AND BANKS.

NOTE.—An admiralty survey of this island being in progress, slight changes in the longitude of some of these points may be found necessary. The longitudes of Port Royal and Kingston, however, have been carefully determined by electric telegraph.

Morant point	Light-house.....	17	55	5	76	11	40	Captain Owen, R. N.
Port Royal.....	Fort Charles flag-staff.....	17	55	56	76	50	38*	Lieutenant-Commander Green, U. S. N.
Kingston.....	Fort.....	17	57	41	76	47	40*	Do.
Savannah Mer.....	Fort Rodney's statue.....	18	12	20	78	8	54	Captain Owen, R. N.
St. Lucia.....	do.....	18	27	45	78	11	23	Do.
Montego bay.....	do.....	18	29	25	77	56	48	Do.
Falmouth.....	do.....	18	30	34	77	40	24	Do.
St. Anne Bay.....	Long wharf.....	18	26	24	77	13	24	Do.
Port Maria.....	Northwest wharf.....	18	23	0	76	54	54	Do.
Port Antonio.....	Fort flag-staff.....	18	11	15	76	27	24	Do.
Pedro bank.....	East end, Portland rock.....	17	8	0	77	27	0	Lieutenant Raper, R. N.
Do.....	Southwest breakers.....	16	48	0	78	13	0	Do.
Do.....	Northwest edge.....	17	36	0	78	52	0	Do.
Baxo Nuevo.....	Sandy cay.....	15	53	0	78	39	4	Do.
Grand Cayman.....	Fort George, west end.....	19	17	45	81	23	54	Captain Owen, R. N.
Little Cayman.....	West point.....	19	39	10	80	7	54	Do.
Cayman Brac.....	Southwest point.....	19	40	35	79	54	59	Do.
Pickle bank.....	Centre.....	20	23	20	80	29	50	Commander Howison, U. S. N.

Table of latitudes and longitudes—Continued.
JAMAICA, WITH ADJACENT CAYS AND BANKS—Continued.

Place.	Exact location.	Latitude, north.			Longitude, west.			Authority.
Formigas bank	Shoal spot	°	'	"	°	'	"	Captain Owen, R. N.
Morant cays	Northeast cay	18	33	0	75	44	24	Captain Napier, R. N.
Navassa island	North extreme	17	26	30	75	58	20	Captain Owen, R. N.
		18	25	10	75	2	3	

HAYTI OR SANTO DOMINGO.

Cape Enragón	Extreme	18	35	51	68	20	40	Lieutenant-Commander Green, U. S. N.
Point Espada	do	18	19	43	68	28	16	
Savina island	Southeast point	18	6	42	68	35	22	
St. Domingo city	British consulate	18	28	12	69	52	0	
Caldera or Salinas point	Extreme	18	12	0	70	36	0	
Avarena point	do	18	7	0	71	0	0	
Trayle rock	Centre	17	37	0	71	41	0	
Alta Vela	Summit	17	28	50	71	39	44	
Beata island	Northwest point	17	36	45	71	32	54	
Jacmel	Wharf	18	13	30	72	33	39	
Vache island	Sand-beach near Northwest point	18	6	0	73	43	40	
Petite Rivière village	Sand-beach in front of huts	18	37	15	74	23	55	
Jeremie	Fort	18	38	15	74	5	54	
Gonaïve island	West point	18	55	26	73	18	34	
Port au Prince	Fort Alexander	18	33	10	72	19	56	
Gonaïves	Verrier point	19	25	42	72	42	52	
Nicolas mole	Fort George	19	49	30	73	0	0	
Port Patix	Wharf	19	57	40	72	48	54	
Cape Hayti harbor	Town fountain	19	46	40	72	10	42	
Manzanillo point	Extreme	19	45	34	71	57	20	
Grange point	West end	19	54	45	71	39	3	
Port Plata	Fort	19	48	34	70	42	6	
Cape Cabron	Extreme	19	21	17	69	16	0	
Samaud town	Fort	19	12	30	69	19	50	

VIRGIN ISLANDS AND PORTO RICO.

NOTE.—Heretofore the longitudes in the Virgin Islands and Porto Rico have depended upon Fort Christian, Saint Thomas being in longitude west 64° 55' 40". As, however, the recent telegraphic determination places this point in longitude 64° 53' 52".3, all the depending longitudes have been increased by 12".5 to conform to the new determination.

St. Thomas	Southwest bastion of Fort Christian	18	20	23.2	64	55	52.5*	Lieutenant-Commander Green, U. S. N. Do.
Christiansted, Santa Cruz	Lang's observatory	17	44	42.7	64	41	17.4*	

West point.....	18	49	9	64	25	57	Lieutenant Lawrence, R. N.
East extreme of reefs.....	18	36	30	64	10	46	Do.
Vixen point.....	18	30	39	64	21	48	Do.
Fort Bart.....	18	25	4	64	36	47	Do.
Ram head.....	18	16	48	64	42	3	Do.
Soldier point.....	18	16	46	65	17	19	Do.
East point.....	18	15	15	65	16	18	Do.
Morro light-house.....	18	28	56	66	7	27.75*	Lieutenant-Commander Green, U. S. N.
Cape Mala Pasqua.....	17	39	0	65	49	12	Lieutenant H. Raper, R. N.
San Juan head.....	18	23	0	65	36	12	Do.

WINDWARD ISLANDS.

Barbados, Ragged point.....	13	9	55	59	25	35	Lieutenant Lawrence, R. N.
Barbados, South point.....	13	5	42.2	59	31	20	Do.
Barbados, Bridgetown.....	13	5	42.2	59	37	17.8*	Lieutenant-Commander Green, U. S. N.
Tobago.....	11	21	0	60	31	0	Staff-Commander Parsons, R. N.
Tobago, Rocky bay.....	11	10	8	60	42	24	Do.
Bequia island.....	12	3	2	61	44	55	Do.
Grenada.....	13	5	0	61	14	0	Lieutenant Raper, R. N.
St. Vincent, Kingston.....	13	9	4	61	13	15	Staff-Commander Parsons, R. N.
St. Lucia, Port Castries.....	14	1	30	61	0	50	Do.
Marinique.....	14	43	53.9	59	37	17.2*	Lieutenant-Commander Green, U. S. N.
Do.....	14	36	7	61	4	0	M. Moulter-Hausse.
Do.....	14	23	32	60	52	3	Do.
Caravelle rock.....	14	28	28	60	32	46	Do.
Sand-beach west of the church.....	15	34	34	61	27	39	Staff-Commander Stanley, R. N.
Flag-staff, fort Young.....	15	17	27	61	23	5	Do.
Centre.....	15	42	0	63	37	46	Lieutenant Lawrence, R. N.
Point-a-Pitre, (Jarry mill).....	16	13	56	61	32	38	MM. Ploix and Caspari.
Flag-staff on Cochon's islet.....	16	12	54	61	31	44	MM. Caspari and Hatt.
Light-house on Manroux islet.....	16	13	14	61	31	28	MM. Ploix and Hatt.
Light-house on Gosier islet.....	16	11	57	61	29	3	Do.
Tower at Port Louis.....	16	25	7	61	31	34	Do.
Flag-staff at Le Moule.....	16	19	54	61	20	15	Do.
Summit.....	16	22	4	61	46	22	Do.
North point.....	16	31	3	61	27	32	Do.
Flag-staff.....	15	59	50	61	43	32	Do.
Light-house.....	16	10	17	61	6	8	Do.
Tower at Grande Bourg.....	15	53	3	61	18	30	Do.
Tower on Chameau hill.....	15	32	61	35	18	0	Do.
Eastern point.....	16	21	16	61	0	7	Do.
Cathedral.....	17	6	13	61	50	27.6*	Lieutenant-Commander Green, U. S. N.
Dockyard flag-staff.....	17	0	0	61	45	18	Captain Barnett, R. N.
Man-of-War point.....	17	3	22	61	39	44	Do.
Light-house.....	17	6	50	61	54	30	Admiralty light-list.
Flag-staff of Martello tower.....	17	35	50	61	49	36	Captain Barnett, R. N.
Plymouth wharf.....	16	42	12	62	13	0	Lieutenant Raper, R. N.
Centre.....	16	55	18	62	18	53	Captain Barnett, R. N.

Table of latitudes and longitudes—Continued.

WINDWARD ISLANDS—Continued.

Place.	Exact location.	Latitude, north.			Longitude, west.			Authority.
Nevis.....	Fort Charles.....	°	'	"	°	'	"	Captain Barnett, R. N.
Booby island.....	Centre.....	17	7	52	62	37	10	Do.
St. Christopher.....	Baseterre church.....	17	13	38	62	35	25	Do.
St. Eustatius.....	Fort flag-staff.....	17	18	12	62	42	55	Lieutenant Lawrence, R. N.
Saba.....	Diamond rock.....	17	29	10	62	58	50	Do.
St. Bartholomew.....	Fort Oscar.....	17	39	10	63	14	57	Captain Barnett, R. N.
St. Martin.....	Fort Maricot.....	17	53	58	62	51	6	Do.
Anguilla.....	Custom-house.....	18	4	7	63	5	21	Do.
Dog Island.....	Centre.....	18	13	6	63	4	15	Do.
Sombreto.....	Light-house.....	18	16	42	63	15	36	Do.
		18	35	37	63	27	48	Do.

BERMUDA.

Ireland island.....	Bastion C.....	°	'	"	°	'	"	H. M. S. Challenger, 1873.
Do.....	Dock-yard clock-tower.....	32	19	37	64	49	10	Do.
		32	19	24	64	49	22	

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